REVISION OF *PHILIPIS* (COLEOPTERA: CARABIDAE: BEMBIDIINAE), A GENUS OF ARBOREAL TACHYINE BEETLES FROM THE RAINFORESTS OF EASTERN AUSTRALIA: TAXONOMY, PHYLOGENY AND BIOGEOGRAPHY

MARTIN BAEHR

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Philipis Erwin, 1994 was erected for the unique *Tachys trunci* Darlington. Extensive fogging activities in montane rainforests of eastern Queensland produced rich material and the following new species of *Philipis* are described: *agnicapitis, alticola, alutacea, atra, bicolor, castanea, cooki, distinguenda, ellioti, frerei, geoffreyi, heatherae, inermis, laevigata, laevis, lustrans, minor, perstriata, picea, picta, planicola, quadraticollis, reticulata, rufescens, ruficollis, sinuata, spurgeoni, striata, subtropica, sulcata, thompsoni, tribulationis, unicolor,* and *vicina*. *Philipis* is redefined and described, with *P. trunci* Darlington redescribed. Almost all species occur in montane rainforest above 900m, generally in moss on tree trunks. The genus occupies the Great Dividing Range in eastern Queensland from the Queensland/New South Wales border to Mt. Finnigan south of Cooktown, with most species in northeastern Queensland. Many species occur on single mountain tops or tablelands, fewer inhabit adjacent uplands, and extremely few species have a wide range or occur on two distant ranges. The Carbine Tableland and the Bellenden Ker Range east of Atherton Tableland are centres of evolution and of species richness. From there the isolated mountain tops of Mt. Finnigan and Thornton Peak in the north, and the higher tops along the east coast in the south have been colonized. According to patterns of distribution and phylogenetic evidence the history of the genus is hypothetized: *Philipis* may be a part of the so-called "Old Gondwanan element" in Australia, with its nearest relatives perhaps the South American *Xystosomus* lineage. High species diversity, however, may be a recent event: caused by uplift of the Great Dividing Range during Pliocene and Pleistocene and its subsequent disintegration into isolated tops and tablelands due to rapid erosion, and also disintegration of former widespread rainforests as a consequence of the increasingly warmer and drier climate during late Tertiary. These events divided the ranges of formerly widespread species and supported allopatric speciation on single mountain tops or ranges. Superimposed on this gradual climatic change were other radical changes during Pleistocene that caused the rainforest to repeatedly retreat up the mountains and then descend again. In that way populations of *Philipis* were repeatedly divided then rejoined, eventually becoming split into the many closely related species. According to phylogenetic evidence, the present 35 species can be thus referred to only 5 original stocks, representatives of which occur in both centres of evolution. □ *Coleoptera, Carabidae, Bembidiinae, Philipis, phylogeny, biogeography.*

Martin Baehr, Zoologische Staatssammlung, Münchhausenstraße 21, D-81247 München, Germany; 10 August 1995

Australian tachyine beetles (*Tachys* sensu lato in the sense of Sloane, 1921) are not very numerous (currently about 75 species are known), but are very diverse. Hence, some of Sloane's species groups have been since included in other genera, e.g. *Pericompsus* Schaum (Erwin, 1974a), *Tachyta* Kirby (Erwin, 1975; Baehr, 1986), *Elaphropus* Motschulsky (including *Tachyura* Motschulsky, *Sphaerotachys* Müller, and the *politus*-group of Andrewes, 1925) (Erwin, 1974b; Baehr, 1987), or have been given even the rank of a new genus, e.g. *Tasmanitachoides* Erwin (Erwin, 1972; Baehr, 1990a). Apart from several species not yet revised but easily referred to the well known genera *Tachys* Stephens sensu stricto, *Paratachys* Casey (including *Eotachys* Jeannel), and *Polyderis* Motschulsky, there still remain other isolated species or small groups of species of unknown relationships that are at present best ranked as unspecified species-groups, e.g. *ectromoides*-group (Darlington, 1962; Baehr, 1989; 1991), *atridermis*-group (*Tachys atridermis* Sloane, ? *T. carinatulus* Sloane), *mitchelli*-group (*T. mitchelli* Sloane), *mulwalensis*-group (*T. mulwalensis* Sloane), *blackburni*-group (*T. blackburni* Sloane), and *trunci*-group (*T. trunci* Darlington).

Although the habits of the Australian species of *Pericompsus*, *Tasmanitachoides*, *Elaphropus*, *Tachyta*, *Tachys*, *Paratachys*, and *Polyderis* are generally known, little is known of the isolated species groups or species mentioned above. It is known that some species of the *ectromoides*-group live in leaf litter of temperate rainforest, others under bark of eucalypts, others on mossy trunks of rainforest trees (Darlington, 1962; Baehr, 1989; 1991), and the unique specimen of *Tachys trunci* was also found on the trunk of a tree in montane rainforest (Darlington, 1963).

While looking for additional material for a review of *Elaphropus* (Baehr, 1987) in the ANIC, Canberra, I found three specimens of a species from the Lamington Plateau in southern Queensland that I was unable to identify at the first glance and that later appeared not to belong to the genus *Elaphropus*. Geoff Monteith, Queensland Museum, informed me that he had found several small tachyine species on mountain tops in North Queensland by means of pyrethrum knockdown on the mossy trunks of rainforest trees. He asked me to identify his specimens and sent me a lot of specimens which turned out to belong to the same genus as those from Lamington Plateau. Since the occurrence of another, numerous, group of arboreal tachyine beetles in eastern Australia neither related to *Tachyta* nor to the *Tachys ectromoides*-group was unexpected, I began work on these specimens, because it would raise most interesting questions as to origin and relationships of this group, the phylogenetic relations of the many included species, and their biogeographic history. However, the word was set aside until more material was available. Now enough material has been accumulated to work on this group, even though additional new species may come to light on as yet unworked mountain tops.

Detailed study of the description and later the type specimen of *Tachys trunci* Darlington revealed that this species belongs to the mentioned group and is conspecific with one of the species collected by Geoff Monteith on Thornton Peak, the type locality of *T. trunci*.

Study of all available species revealed several character states common to all species. Some are apparently very primitive, the phylogenetic state of others is still obscure, but they are rather unusual in Tachyini. In some phylogenetically relevant characters (e. g. the truncate anterior tibia, the lateral position of the apical striole, the elongate terminal palpomere of both palpi), as well as in certain characteristics of shape and habitus, this new genus is very similar to the South American genus *Xystosomus* Schaum (Erwin, 1973) and its allies (Erwin, 1994) which include at least some arboreal or semiarboreal species (Erwin, 1973; 1974b, 1994).

Erwin (1994) redefined the *Xystosomus*-lineage and during his study, reexamined the type specimen of *Tachys trunci* Darlington and erected *Philipis* to accomodate it. Due to his very limited material, Erwin's generic concept is, unfortunately, rather limited and the diagnosis given in his key proves true only for *Philipis trunci* and a few other species. Moreover, Erwin's key does not permit unequivocal differentiation of *Philipis* from the American *Mioptachys*. I had no opportunity to study *Mioptachys* in detail, therefore I am not prepared to give a well founded differentiation of both genera at present.

Measurements

Measurements were made with a stereo microscope using an ocular micrometer. Length was measured from tip of labrum to apex of elytra, hence these measurements may slightly differ from those made by other authors. Length of elytra was measured from humeral tooth to apex, length of pronotum from anterior angle to middle of basis, width of apex of pronotum between the position where the anterior transverse sulcus meets the anterior border, and width of head including eyes.

Abbreviations

Institutions: ANIC- Australian National Insect Collection, Canberra; CBM- Collection M. Baehr, München; MCZ-Museum of Comparative Zoology, Cambridge, Massachusetts; MDPI-Queensland Department of Primary Industries, Mareeba; QM- Queensland Museum, Brisbane; USNM- United States National Museum, Washington, D. C.; ZSM- Zoologische Staatssammlung, München.

Collectors: AG- Alistair Graham; DC- Doug Cook; DY-David Yeates; ES- Evan Schmidt; EW- Earthwatch; GM- Geoff Monteith; GT-Geoff Thompson; HJ-Heather Janetzki; JF- John Lawrence; LR- Lewis Roberts; QM- Queensland Museum; RS- Rae Sheridan; SH- Simon Hamlet; SM- Sybil Monteith; TW- Tom Weir.

RF- rainforest; Pyr.- Pyrethrum knockdown.

Collecting Methods

Almost all material considered in this revision has been collected by G. Monteith and his coworkers at the Queensland Museum. Altogether 486 specimens have been examined. Because the

method used for the collection of almost all specimens is not generally known, a description of the method is provided here by Geoff Monteith:

Sheets of light nylon fabric about 1.5m square are laid flat on the ground beneath any vertical surfaces which can be found. These are mostly the trunks of standing trees, both dead and alive, but other surfaces such as large logs, stumps, boulders, rock faces and earth banks are also utilized. The vertical surfaces are then sprayed with cans of household pyrethrum aerosol insecticide. Small insects on the surfaces, which are usually densely mossy, fall on to the fabric sheets. After about 30 minutes the sheets are carefully picked up and the insects shaken into a suspended fabric funnel with a jar of alcohol attached. The bulk sample thus obtained is later sorted under the microscope. Fig. 1 shows the technique being used in a north Queensland rainforest.

Characters

The main characters for the distinction of species are shape of pronotum and elytra, colour and pattern, degree of elytral striation, degree of microreticulation of head, pronotum, and elytra, and the male genitalia, especially shape of aedeagus and its apex, structure of the sclerites in the internal sac, and shape of parameres and number and position of their apical setae.

Taxonomic Principles

Many of the species mentioned herein are very closely related and most of them belong to rather well defined species groups. Only a few species bear striking autapomorphic features. Although many species possess fully developed wings, in general they seem to be restricted to single mountain formations; with very few widespread species. Since most species groups have populations dispersed over diverse mountain tops or ranges and hence the species are allopatric, they could be described as groups of allopatric subspecies. However, because the definition of subspecies is principally more crucial than the definition of species, I generally prefer to describe species rather than subspecies, when the differences in external and/or genitalic characters are constant, even when they are rather feeble.

Phylogenetic Principles

In establishing phylogenetic relationships I follow principles proposed by Hennig (1966) and initially adopted by Brundin (1966). I did not choose the quantitative phyletic approach (perhaps better called "numerical cladistic") which chiefly proceeds according to the principle of parsimony because character analysis must be the prior condition to the construction of a phylogenetic tree and the criterion of parsimony to be used posteriorly to character analysis. Parsimony may be perhaps not as important when tracing phylogeny as most proponents believe. Evolution of species does not necessarily proceed according to that criterion, but commonly proceeds in a circutious way in which case application of the principle of parsimon may easily generate fictitious results.

Although speciation occurs according to the rules of the biological species concept, in insects at least, its observation under natural conditions is rarely possible. Hence characters are needed as a means for distinguishing species. Although morphological structures are most widely used, other characters may be of the same value, e.g. physiological, etho-ecological, cytological, or genetical. But even genetics yield only characters and hence do not solve the problem of applying the biological species concept to recognizing species.

Reconstruction of the phylogeny and history of the fauna or of a given superspecific taxon is primarily based on the acquisition of adaptations (i.e. characters), therefore analysis of the ancestral or derivative status of characters is generally the only way to reconstruct phylogeny. As Hennig (1966) demonstrated, only derivative (apomorphic) character states are useful in such phylogenetic classification, because they alone define monophyletic groups and can be used to establish sister group relations.

As a first step towards a phylogenetic classification and analysis of faunal history the attempt is made to determine the state of the characters used. Character analysis, i.e. decision about plesiomorphy and apomorphy of characters, is based either on outgroup comparison using character states found in related taxa of higher categories as explained by Wiley (1981) and Watrous & Wheeler (1981), or on group trends as explained by Ross (1974). The latter method was used especially in such cases, when strictly synapomorphic states were difficult to perceive because of parallelisms or reductions of characters. So it will be noted in the phylogenetic analysis that only common evolutionary trends can be traced, rather than well founded sister group relations.

BIOGEOGRAPHIC PRINCIPLES

Knowledge of the phylogenetic relations of the species is prerequisite for any considerations about historical biogeography. Indeed, I do not trust the unweighed clues to geographical history used by Darlington (1957, 1971) and repeated by Erwin (1970). Hence, in general, I follow the considerations of Hennig (1966) and Brundin (1966) in that plesiomorphy of a taxon and its geographic origin are commonly correlated, that the most apomorphic taxa are therefore usually found at the margins of the range of the supraspecific taxon, and that this pattern of distribution is mainly caused by vicariance biogeography and commonly reflects a continuous distribution on old land masses or in continuous biota that are today dismembered. However, in some instances it may be caused by dispersal biogeography, e.g. when new areas are colonized and later separated by geographical or ecological barriers.

SYTEMATICS

Subfamily BEMBIDIINAE
Subtribe XYSTOSOMINA

Philipis Erwin, 1994: 567

TYPE SPECIES

Tachys trunci Darlington, 1963, by monotypy.

NOTE

Erwin's description of *Philipis* was based on the single species *Tachys trunci* and actually only on the male holotype and on two females from G. Monteith's material sent to him for examination. Therefore his generic diagnosis and description are both of limited value and a full redescription of the genus is given below. Unfortunately the characters for keying out the genus *Philipis* used by Erwin (1994) in his key to the genera of the subtribe Xystosomina are incidental characters of *P. trunci* and do not allow the determination of the genus for most species now known. I am not familiar enough with the Neotropical taxa, especially *Mioptachys* Bates, to allow the proposal of a generic key to replace Erwin's and thus the genus *Philipis* remains recognisable only on characters of distribution.

DIAGNOSIS

Facial sulci deep, anteriorly more or less distinctly doubled, reaching clypeus; terminal palpomere of both palpi very elongate; anterior transverse sulcus of pronotum distinct and usually deep; apex of protibia almost truncate, laterally at most slightly oblique; sutural stria deeply impressed and anteriorly recurved; apical striole nearer to lateral border than to suture, incurved anteriorly and meeting 3rd stria or its position; 3rd stria with 2 discal setae and one seta within the apical striole; aedeagus moderately elongate with widely rounded apex, a complexly folded sclerite inside internal sac, apex of internal sac microtrichiate; parameres triangular, mostly 5-setose, rarely 4-setose; female stylomere 2 ensiform, rather short, with two stout ventral ensiform setae, a large dorsal ensiform seta situated rather basally, and a nematiform seta originating in a groove near apex.

The genus includes *Philipis trunci* (Darlington) and 34 new species described below.

DESCRIPTION

Small (1.8-2.8mm long), either fairly elongate and moderately depressed, or rather short and convex species.

Colour black, or piceous, or reddish, with or without a light elytral pattern consisting of a spot or a transverse or oblique fascia in posterior third, commonly also with a more or less distinct humeral spot or fascia. In some species pronotum red. Usually 1st-3rd antennomeres and basal half of 4th antennomere of antenna yellow, rest dark. Palpi and mouth parts yellow or partly infuscate. Lower surface reddish, brown, anteriorly commonly slightly darker. Legs yellow or partly infuscate.

Head short and compact. Eyes large. Neck wide. Frons and vertex convex. Clypeus separated from frons by shallow suture; frons usually with shallow circular groove in middle, commonly also with circular or oblique groove medially of facial sulci. Labrum short, 6-setose. Mandibles elongate, at apex incurved. Mentum with prominent tooth, bisetose, with two deep, though not perforate foveae. Gula bisetose. Glossa narrow, rather triangular at apex, 3- or 5-setose, with the longest seta in middle; paraglossa membraneous, elongate, as long as glossa or nearly so. Lacinia elongate, apex incurved, inner margin with a series of strong, elongate bristles. Penultimate palpomere of labial palpus short, globose, pilose, apical palpomere thin, remarkably elongate, usually almost as long as penultimate palpomere. Maxillary palpus rather elongate, pilose, apical palpomere thin, very elongate. Antenna rather short, sparsely pilose from 2nd antennomere, densely pilose from apical half of 4th antennomere. Median an-

FIG. 1. Queensland Museum staff using the technique of pyrethrum knockdown in a North Queensland rainforest. A, Nylon sheet spread on ground at base of tree while trunk is sprayed with aerosol pyrethrum. B, Fallen insects on sheets are then shaken into a suspended funnel with alcohol jar attached.

tennomeres globose or up to twice as long as wide.

Pronotum much wider than head. Base usually much wider than apex; anterior angle rounded off, not or barely projecting; lateral margins near base but slightly convex or almost straight; posterior angle usually about rectangular, commonly posteriorly slightly projecting. Anterior transverse sulcus always distinct, usually deep, v-shaped, impunctate. Median line distinct, though ususally fine, not reaching base. Posterior transverse sulcus deep, impunctate, commonly interrupted in middle by a deep fovea. Lateral channel deep and rather wide, posteriorly more or less widened; with two lateral setae, the anterior seta situated at or behind anterior third, the posterior at basal angle. Basal grooves deep, laterally bordered by a conspicuous, elongate, usually straight to slightly oblique carina. Prosternum with sparse, erect pilosity.

Elytra fairly elongate and depressed, or more or less convex and short. When elytra depressed, then commonly with a distinct transverse impression in anterior third, sometimes each elytron with a large, circular impression behind middle. Lateral channel deep and wide. Lateral margin commonly finely serrate and pilose. Sutural stria always deeply impressed and anteriorly curved towards scutellar pore. 2nd-7th striae present or reduced to various degrees, or all or some striae indicated as rows of punctures, or deeply channelled, or completely absent. 8th stria present, usually attaining at least the posterior pore of the anterior group of marginal pores, rarely ending shortly behind this pore; usually deeply impressed, commonly punctate-crenulate. Apical striole situated rather close to lateral border, but anteriorly more or less incurved to meet the end of the 3rd stria or its position; striole usually deep, deepened at the position of incurvation. 3rd stria with two discal pores and setae at about anterior third and behind middle, and with a pore and seta within the apical striole. Marginal pores large, setae not very elongate, but usually markedly

different, anterior group consisting of 4, posterior group of 2 + 2 pores, separated by a wide glabrous space. Wings fully developed or more or less reduced. Prosternum with few erect hairs. Metepisternum almost quadrate to c. 1.5 x as long as wide at apex.

Abdomen smooth, impilose, each sternite with a pair of ambulatory setae, last visible sternite in males with 2, in females with 4 setae near border in a transverse row.

Legs normal shaped, apex of protibia truncate, lateral border not at all excised. Two basal tarsomeres of male protarsus slightly asymetrically widened and clothed with adhesive setae. Claws large, elongate, not serrate.

Microreticulation on head usually rather coarse, isodiametric, though commonly reduced and more or less superficial on frons and vertex, but still present on labrum, clypeus and near lateral margin. Pronotum with or without isodiametric microreticulation. Elytra with distinct or superficial microreticulation, or without any microreticulation. Microreticulation usually transverse, rarely almost isodiametric. Sometimes intervals with very sparse, extremely fine puncturation.

Male genital ring triangular, feebly asymmetric. Aedeagus variously shaped, with asymmetrical basal lobe and usually short, convex apex. Internal sac in middle with complexly coiled sclerites. Apex of internal sac with a densely trichose or spinose field. Parameres with 4 or 5 apical or subapical setae, left paramere larger than right.

Female stylomere 2 ensiform, with 2 strong ventral ensiform setae, 1 dorsal ensiform seta situated rather basally, and a nematiform seta originating in a groove. Shape of stylomeres highly uniform throughout the genus.

Distribution

Rainforests of eastern Queensland from the Queensland/New South Wales border north to about Cooktown, though most species on the eastern fringes of the Atherton and Carbine Tablelands in north Queensland.

Habitat

Almost all specimens collected by pyrethrum knockdown from mossy tree trunks of rainforest trees; a few were from Berlese extraction of moss and litter. They occur with few exceptions on high mountain tops above c. 900m.

KEY TO THE SPECIES OF THE GENUS *PHILIPIS* ERWIN

Because many species are apparently restricted to a single range or even to one mountain top, and perhaps even to a narrow altitude range, the known range of the species is generally recorded in the key. It should be noted, however, that the recorded geographic and altitudinal ranges may change due to additional collecting work. So distribution should not be used as a *prima facie* character for determination.

1. Elytra without distinct colour pattern 2
   Elytra with distinct colour pattern, each elytron unimaculate or bimaculate, or fasciate 5

2. Rather short, dorsally convex species, lateral borders of pronotum convex throughout, though sometimes irregularly convex. Aedeagus as in Figs 4D-E. Bellenden Ker Range, and mountains near Eungella, northwest of Mackay . . 3
   Rather elongate and depressed species, lateral borders of pronotum in posterior half straight or even faintly concave, though sometimes slightly oblique. Aedeagus as in Fig. 4C or unknown. Mountains near Mossman and near Cape Tribulation 4

3. Smaller, shorter species, body length <2.25mm, ratio length/width of elytra <1.3. Colour piceous. Lateral margin of pronotum evenly rounded, basal angle slightly produced backwards. Aedeagus, Fig. 4D. Bellenden Ker and Malbon Thompson Ranges, between 900-1450m . . . . . *unicolor* sp. nov.
   Larger, more elongate species, body length 2.40mm, ratio length/width of elytra 1.37. Colour black. Lateral margin of pronotum irregularly rounded, compressed in basal half, basal angle not produced backwards. Aedeagus, Fig. 4E. Mt. Macartney north of Eungella, northwest of Mackay . . . . . *atra* sp. nov.

4. Lateral borders of pronotum faintly concave, pronotum at base as wide as in middle. At least 5 inner striae well visible. Aedeagus unknown. Mossman Bluff at c.850m . . . *picea* sp. nov.
   Lateral borders of pronotum straight, pronotum at base narrower than in middle. Only 2 inner striae well visible, others very faint. Aedeagus, Fig. 4C. Thornton Peak and mountains west of Cape Tribulation above c.750m . . . . . *castanea* sp. nov.

5. Elongate, depressed species, elytra only with postmedian fascia 6
   Short, convex species, pattern of elytra variable 12

6. Elytra without distinct transverse impression in anterior third (doubtful species under both couplets) 7

Elytra with distinct impression in anterior third 9

7. At least 4 inner intervals of elytra distinctly convex in anterior half. Large species, body length >2.7mm. Pronotum in middle barely wider than at base. Aedeagus unknown. Mountains northwest of Mossman, Massey Range west of Bellenden Ker Range, between 1000-1200m . . . . . *quadraticollis* sp. nov.

Only 2 inner intervals of elytra distinctly convex in anterior half. Smaller species, body length <2.35mm. Pronotum variable. Adeagus, Fig. 4B or unknown 8

8. Pronotum in middle perceptibly wider than at base. Smaller species, body length <2.25mm. 2 inner intervals of elytra distinctly convex. Lower surface of aedeagus straight, Fig. 4B. Mt. Spurgeon above 1100m . . . . . *laevigata* sp. nov.

Pronotum in middle barely wider than at base. Larger species, body length c. 2.35mm. Only sutural interval of elytra distinctly convex. Aedeagus unknown. Isley Hills south of Cairns . . . . . *heatherae* sp. nov.

9. Pronotum in middle barely wider than at base, ratio widest part/base <1.04. Postmedian elytral fascia not s-shaped. Mountains east of Atherton Tableland 10

Pronotum in middle distinctly wider than at base, ratio widest part/base >1.07. Postmedian elytral fascia more or less distinctly s-shaped. Mountains west of Mossman 11

10. Large species, body length >2.7mm. Colour dark reddish. Transverse impression in anterior third of elytra deep. 2nd stria distinctly impressed, 3rd-5th striae distinct. Aedeagus unknown. Bellenden Ker Range at 1560m . . . . . *alticola* sp. nov.

Smaller species, body length c. 2.35mm. Colour dark piceous. Transverse impression in anterior third of elytra shallow. 2nd stria barely impressed, 3rd-5th striae very weak. Aedeagus unknown. Isley Hills south of Cairns . . . . . *heatherae* sp. nov.

11. Larger species, body length >2.35mm. Pronotum wider, base wider, ratio base/apex >1.45. Aedeagus longer with narrower apex, both parameres 4-setose, Fig. 4A. Mountains immediately west of Mossman above 1000m . . . . . *cooki* sp. nov.

Smaller species, body length <2.25mm. Pronotum narrower, base narrower, ratio base/apex <1.40. Adeagus shorter with wider apex, both parameres 5-setose, Fig. 4B. Mt. Spurgeon at 1100m . . . . . *laevigata* sp. nov.

12. Elytra unimaculate or -fasciate 13

Elytra distinctly bimaculate or -fasciate (doubtful species under both couplets) 22

13. Elytra with circular or slightly transverse macula or fascia (Figs 12D-E). Pronotum reddish or pronotum remarkably narrow, ratio width/length <1.35 , with narrow base, ratio base/apex <1.35. Elytra rather elongate, ratio length/width >1.35. Aedeagus as in Figs 4F, 5A. Mt. Finnigan . . 14

Elytra with conspicuously s-shaped, oblique fascia (Figs 12F, 13B-D). Pronotum not reddish and pronotum wider, ratio width/length >1.40, with wider base, ratio base/apex >1.38. Elytra shorter, ratio length/width <1.35 . Aedeagus as in Figs 5B-F, 6A. Distribution further south 15

14. Larger species, body length >2.3mm. Pronotum reddish, wider, ratio width/length >1.40, with wider base, ratio base/apex >1.45. Aedeagus, Fig. 4F. Above 850m . . . . . *ruficollis* sp. nov.

Smaller species, body length <2mm. Pronotum dark piceous to black, narrower, ratio width/length <1.35, with narrow base, ratio base/apex <1.35. Aedeagus, Fig. 5A. Above 1100m . . . . . *inermis* sp. nov.

15. Lateral borders of pronotum in posterior half straight, base as wide as or even wider than widest diameter in middle. Lower surface of aedeagus almost straight, apex not perceptibly curved down (Fig. 5C). Eastern foothills of Bellenden Ker Range below 100m . . . . . *planicola* sp. nov.

Lateral borders of pronotum in posterior half perceptibly convex, base distinctly narrower than widest diameter in middle. Lower surface of aedeagus either concave or apical third curved down (Figs 5B, 5D-F, 6A). Distribution different or upland species 16

16. 5th-7th intervals not perceptibly weaker than inner intervals 17

5th-7th intervals markedly weaker than inner intervals, or absent 18

17. Striae not impressed, intervals not convex. Microreticulation of elytra weak, surface glossy. Base of pronotum wider, ratio base/apex >1.5. Aedeagus, Fig. 5B. Cape Tribulation below 150m . . . . . *striata* sp. nov.

Striae in basal half slightly impressed, intervals perceptibly convex. Microreticulation of elytra distinct, surface rather dull. Base of pronotum less wide, ratio base/apex 1.45. Aedeagus unknown. Bellenden Ker Range at 1000m . . . . . *reticulata* sp. nov.

18. 1st and 2nd striae equally deeply impressed, 3rd-5th striae very inconspicuous or absent. Aedeagus shorter (Fig. 5D). Thornton Peak above 900m . . . . . *trunci* (Darlington)

2nd stria distinctly less deeply impressed than 1st, or not impressed, 3rd-5th striae visible as rows of punctures. Aedeagus longer (Figs 5E-F, 6A). Distribution different 19

19. Smaller species, body length <2.15mm, and base of pronotum rather narrow, ratio base/apex <1.42. Aedeagus, Fig. 5E. Mountains west of Cape Tribulation and Windsor Tableland above 700m . . . . . *tribulationis* sp. nov.
Commonly larger species, body length >2.20mm, or base of pronotum wider, ratio base/apex >1.45. Aedeagus as in Figs 5F, 6A. Distribution different 20

20. Aedeagus shorter, with shorter apex and lower surface not perceptibly bisinuate (Fig. 5F) and surface of elytra without distinct microreticulation and outer striae very fine and base of pronotum wider, ratio base/apex >1.45. Mountains from Atherton Tableland south to Cardwell Range above 700m . . . . . *thompsoni* sp. nov.
Either aedeagus longer, with longer apex and lower surface perceptibly bisinuate (Fig. 6A) or surface of elytra distinctly microreticulate or outer striae rather distinct or base of pronotum narrower, ratio base/apex <1.45. Distribution different 21

21. Microreticulation of elytra almost absent, elytra as glossy as pronotum. Aedeagus, Fig. 6A. Mt. Misery south of Helenvale above 850m . . . . . *vicina* sp. nov.
Microreticulation of elytra distinct, elytra perceptibly less glossy than pronotum. Aedeagus unknown. Mt. Spurgeon area at 1330m . . . . . *spurgeoni* sp. nov.

22. Only sutural stria of elytra present. Surface of pronotum and elytra extremely glossy, without any trace of microreticulation. Wide, highly convex species with very short elytra, ratio length/width <128 . Aedeagus, Fig. 6B. Thornton Peak above 1000m . . . . . *laevis* sp. nov.
At least traces of outer striae visible. Surface usually less glossy, at least with some traces of microreticulation. Usually less wide and convex species with longer elytra, ratio length/width >1.29, rarely less, but then elytra completely and deeply striate. Aedeagus different. Distribution different 23

23. Elytra completely striate and striae deeply impressed, outer striae not perceptibly weaker than inner, all intervals remarkably convex. Aedeagus with elongate apex and deep concavity in front of apex (Fig. 6C), or unknown . . 24
At least outer striae not deeply impressed, distinctly weaker than inner, often elytra not completely striate, not all intervals convex. Aedeagus different 25

24. Wider and on the average larger species, body length 2.05-2.50mm. Pronotum wider, ratio width/length >1.53, ratio base/apex >1.48. Elytra shorter, ratio length/width <1.31. Aedeagus, Fig. 6C. Mountains west of Mossman between 480-1300m . . . . . *sulcata* sp. nov.
Narrower and smaller species, body length 2.05mm. Pronotum narrower, ratio width/length 1.41, ratio base/apex 1.37. Elytra longer, ratio length/width >1.38. Aedeagus unknown. Mt. Bartle Frere above 1600m . . . . . *perstriata* sp. nov.

25. Posterior elytral fascia distinctly s-shaped and basal elytral macula well delimited, triangular, meeting lateral border 26
Posterior elytral fascia variable, when s-shaped, then basal elytral macula less well delimited, often rather vague, and not meeting lateral border 29

26. Pronotum reddish, elytral pattern very distinct. At least 6 inner striae well marked, though only sutural stria impressed. Aedeagus, Fig. 7E. Mt. Demi southwest of Mossman above 1100m . . . . . *bicolor* sp. nov.
Pronotum piceous, elytral pattern less distinct. At most 4 inner striae well marked and more or less impressed. Aedeagus as in Figs 7D, 7F, 8A. Distribution different 27

27. Elytra barely striate, only sutural stria distinct and impressed, other striae very indistinct. On the average larger species, body length 2.2mm. Aedeagus very short, with short apex (Fig. 7D). Mt. Finnigan above 1100m . . . . *picta* sp. nov.
Elytra more extensively striate, at least 3 inner striae distinct and somewhat impressed. On the average smaller species, body length <2.2mm. Aedeagus longer, with longer apex (Figs 7F, 8A). Distribution different 28

28. Larger and wider species, body length >2.1mm, ratio length/width of elytra <1.32, with wider pronotum, ratio width/length >1.55. Lower surface of aedeagus almost straight, apex narrower (Fig. 7F). Mt. Spurgeon area above 1250m . . . . . *geoffreyi* sp. nov.
Smaller and narrower species, body length 2mm, ratio length/width of elytra 1.35, with narrower pronotum, ratio width/length <1.5. Lower surface of aedeagus distinctly bisinuate, apex wider (Fig. 8A). Mossman Bluff west of Mossman at 1180m . . . . . *minor* sp. nov.

29. Posterior fascia distinctly s-shaped 30
Posterior fascia not distinctly s-shaped (doubtful species under both couplets) 33

30. Larger species, body length >2.6mm 31
Smaller species, body length <2.5mm 32

31. Wider species, ratio length/width of elytra <1.36, with wider pronotum, ratio width/length >1.5, ratio base/apex >1.5. Lower surface of aedeagus gently concave (Fig. 8B). Bellenden Ker Range above 1500m . . . *sinuata* sp. nov.
Narrower species, ratio length/width of elytra >1.38, with narrower pronotum, ratio width/length <1.48, ratio base/apex <1.48. Lower surface of aedeagus gently bisinuate

(Fig. 8C). Mossman Bluff west of Mossman between 480-1200m . . *distinguenda* sp. nov.

32. More or less reddish species, but at least pronotum somewhat reddish. Pronotum and elytra strongly microreticulate. Posterior elytral fascia rather weakly s-shaped (Fig. 15A). Aedeagus longer, lower surface gently concave, parameres 4-setose (Fig. 7A). Bellenden Ker Range above 1500m . . . . . *rufescens* sp. nov.
Piceous species, pronotum not reddish. Pronotum and elytra glossy, almost devoid of microreticulation. Posterior elytral fascia markedly s-shaped (Fig. 16E). Aedeagus short, compact, lower surface bisinuate, parameres 5-setose (Fig. 8D). Bellenden Ker Range and Lambs Head, between 900-1200m . . . . . *lustrans* sp. nov.

33. Pronotum remarkably wide at base, ratio base/apex >1.6, ratio widest diameter/base <1.06. Microreticulation of elytra isodiametric, surface rather dull. Lower surface of aedeagus markedly bisinuate, apex very wide (Fig. 6F). Bellenden Ker above 1500m . *alutacea* sp. nov.
Pronotum less wide at base, ratio base/apex <1.5, ratio widest diameter/base >1.10. Microreticulation of elytra transverse, surface less dull. Aedeagus different (Figs 6D-E, 7A-C) 34

34. Pronotum and elytra strongly microreticulate. Lateral borders of pronotum posteriorly not convex, though oblique. Posterior elytral fascia oblique, feebly s-shaped (Fig. 15A). Aedeagus, Fig. 7A. Bellenden Ker Range above 1500m . . . . . *rufescens* sp. nov.
Microreticulation of pronotum and elytra weaker or absent. Lateral borders of pronotum posteriorly usually perceptibly convex, when straight, then posterior elytral fascia transverse. Posterior fascia transverse or oblique, but not at all s-shaped (Figs 14D-E, 15C-E). Aedeagus as in Figs 6D-E, 7B-C. Distribution different 35

35. Only sutural stria impressed. On average larger species, body length 2.3-2.8mm. Posterior elytral fascia transverse. Aedeagus with elongate, wide apex and a strongly sclerotized peg in internal sac (Fig. 6E). Lamington Plateau, south Queensland, above 1000m . . . . . *subtropica* sp. nov.
Additional striae perceptibly impressed. On average smaller species, body length 1.85-2.45mm. When larger than 2.3mm, then inner 3-4 striae markedly impressed and posterior elytral fascia oblique. Aedeagus different (Figs 6D, 7B-C), north Queensland 36

36. Posterior elytral fascia oblique (Fig. 14D). On average larger species, body length 2.05-2.45mm, with wider pronotum, ratio width/length >1.6. 3-4 inner striae conspicuously impressed and feebly punctate. Aedeagus, Fig. 6D. Mt. Bartle Frere above 1500m . . . . . *frerei* sp. nov.
Posterior elytral fascia rather transverse (Figs 17C-D). On average smaller species, body length 1.85-2.3mm, with narrower pronotum, ratio width/length <1.57. Inner striae less conspicuously depressed, but distinctly punctate. Aedeagus as in Figs 7B-C. Distribution different 37

37. Elytra slightly darker, hence pattern more contrasting. Lateral border of pronotum usually less convex in posterior half, base wider, ratio base/apex <1.38. Aedeagus narrower, with larger apex, parameres with 4, rarely left paramere with 5 setae (Fig. 7B). Mt. Elliot above 1000m . . . . . *elliori* sp. nov.
Elytra slightly lighter, hence pattern less contrasting. Lateral border of pronotum usually rather convex in posterior half, base narrower, ratio base/apex <1.37. Aedeagus wider, with smaller apex, both parameres always 5-setose (Fig. 7C). Lambs Head near Edmonton, at 1200m . . . . . *agnicapitis* sp. nov.

NOTE

In the following descriptions only those characters are mentioned in detail that are distinctive for the respective species.

Philipis quadraticollis sp. nov.
(Figs 11A, 16F, 17C)

MATERIAL EXAMINED

HOLOTYPE: QMT13508; ♀, Devils Thumb area 10km NW Mossman, NEQ, 10 Oct 1982, 1000-1180m, Monteith, Yeates & Thompson, Pyrethrum knockdown, RF.

PARATYPE: 1 ♀, 17°14'S x 145 °48'E Massey Ra., 6km NW of Bellenden Ker, NEQ, 1150m, 11 Oct 1991, Pyr., GM & HJ (CBM).

DIAGNOSIS

Large, depressed, with an oblique fascia in posterior half of elytra. Distinguished by absence of transverse impression in anterior third of elytra, large size, and convex four inner intervals of elytra.

DESCRIPTION

Measurements. Length: 2.7-2.8mm; width: 1.20-1.25mm. Ratios: Width pronotum/head: 1.48-1.49; width/length of pronotum: 1.55-1.58; width base/apex of pronotum: 1.57-1.60; width widest diameter/base of pronotum: 0.99; length/width of elytra: 1.43.

Colour. Chestnut brown, head slightly darker. Sutural interval lighter posteriorly. Elytra in posterior 2/5 with an oblique, at medial end strongly recurrent yellow fascia not attaining suture.

Head. Median antennomeres c. 1.2 x as long as wide. Microreticulation on frons distinct, though somewhat superficial, isodiametric, on vertex less distinct. Surface moderately glossy, on vertex rather glossy.

Pronotum. Fairly depressed, transverse, widest near base, base much wider than apex. Lateral margin anteriorly strongly rounded, posteriorly straight. Posterior angle rectangular, faintly produced over lateral part of base. Carina at posterior angle elongate, oblique, slightly incurved. Anterior transverse sulcus comparatively shallow, uninterrupted in middle. Posterior transverse sulcus slightly interrupted in middle. Anterior lateral seta situated slightly behind anterior third of margin. Surface almost devoid of microreticulation, with scattered, extremely fine punctures, highly glossy.

Elytra. Rather elongate, moderately convex, widest in middle; lateral border almost evenly curved, though in middle almost straight. Disk not impressed in anterior third. Sutural stria finely punctulate. 2nd-5th striae impressed, punctate, 6th and 7th striae visible as rows of fine punctures. All innner striae traceable to far down apex. Most intervals, apart from 7th and 8th, distinctly convex, at least in anterior half. 8th stria deeply impressed, punctate, attaining posterior marginal pore. Recurrent striole deep, punctulate, clearly meeting 3rd stria. Anterior discal pore in anterior third, posterior pore in posterior 2/5. Microreticulation on disk barely visible, at apex slightly more distinct, composed of transverse meshes. Surface with scattered, extremely fine punctures, highly glossy. Wings fully developed.

Lower surface. Metepisternum 1.5 x as long as wide.

Genitalia. Male unknown. Female stylomere 2 with dorsal ensiform seta situated rather basally.

Variation. Apart from some variation of relative shape of pronotum, little variation noted.

DISTRIBUTION

Mountains to the east of Atherton Tableland and to the northwest of Mossman, north Queensland.

HABITAT

Both known specimens collected by pyrethrum knockdown on mossy tree trunks in montane rainforests above 1000m.

ETYMOLOGY

Refers to the quadrate shape of pronotum.

REMARKS

Because both specimens are females, it is not fully settled, whether they are actually conspecific. Discovery of males from both localities would be very useful.

Philipis alticola sp. nov.
(Figs 11B, 17C)

MATERIAL EXAMINED

HOLOTYPE: QMT13509; ♀,Bellenden Ker summit, NEQ, 10 June 1980, G. B. Monteith.

DIAGNOSIS

Large, depressed, with oblique fascia on posterior half of elytra. Distinguished by wide base of pronotum that is almost as wide as in middle, by fascia of elytra not s-shaped, and by impressed 2nd interval and fairly distinct 3rd-5th intervals.

DESCRIPTION

Measurements. Length: 2.75mm; width: 1.24mm. Ratios: Width pronotum/head: 1.41; width/length of pronotum: 1.45; width base/apex of pronotum: 1.48; width widest diameter/base of pronotum: 1.04; length/width of elytra: 1.45.

Colour. Chestnut brown, head and lateral parts of elytra slightly darker. Sutural interval posteriorly feebly lighter. Elytra in posterior 2/5 with oblique, feebly s-shaped, at medial margin not recurrent yellow fascia not attaining suture.

Head. Median antennomeres c. 1.5 x as long as wide. Microreticulation on frons distinct, isodiametric, slightly less distinct on vertex. Surface moderately dull, more glossy on vertex.

Pronotum. Fairly depressed, transverse, widest well in front of middle, base much wider than apex. Lateral margin posteriorly almost straight, though somewhat oblique. Posterior angles rectangular, faintly produced over lateral part of base. Carina at posterior angle elongate, oblique, slightly incurved. Anterior transverse sulcus rather deep, interrupted in middle. Posterior transverse sulcus very deep, interrupted by a fovea. Anterior lateral seta situated at anterior third of margin. Surface with fairly superficial, almost isodiametric microreticulation, fairly glossy.

Elytra. Rather elongate, moderately convex, widest in middle. Lateral border almost evenly curved, though in middle almost straight. Disk in anterior third at position of anterior discal seta

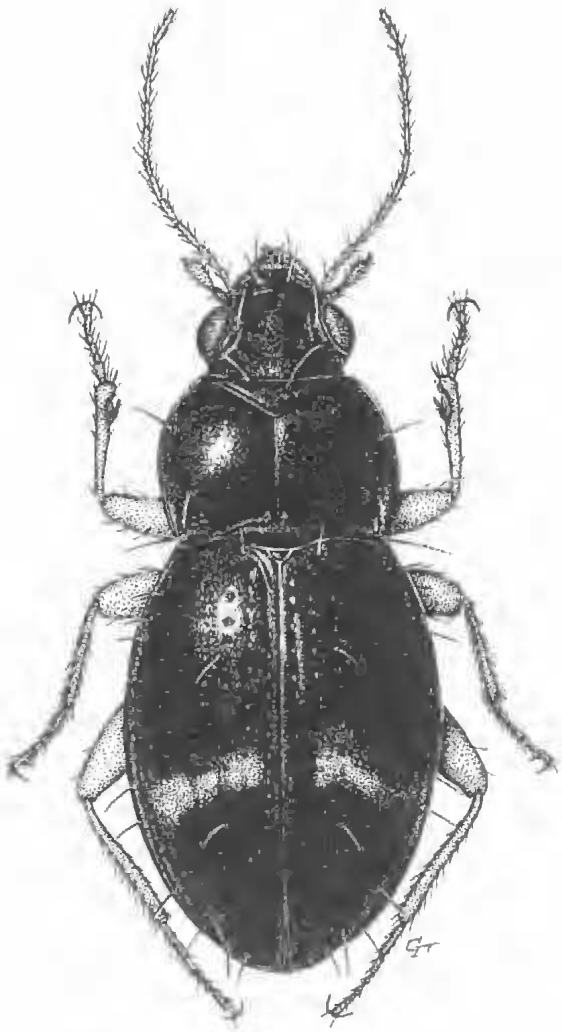

FIG. 2. Dorsal view of *Philipis thompsoni* sp. nov.

with conspicuous, rather deep depression. Sutural stria finely punctulate. 2nd stria almost completely impressed, punctate, 3rd-5th striae visible as rows of fine punctures. Outer striae only traceable in anterior half as rows of extremely fine punctures. Intervals, apart from sutural and 2nd intervals completely depressed. 8th stria deeply impressed, punctate, anteriorly shallower, not attaining posterior marginal pore. Recurrent striole elongate, oblique, meeting 3rd stria. Anterior discal pore in anterior third, posterior pore in posterior 2/5. Microreticulation distinct, though fairly superficial, composed of transverse meshes. Surface rather glossy. Wings fully developed. Variation unknown.

Lower surface. Metepisternum c. 1.5 x as long as wide.

Genitalia. Male unknown. Female stylomere 2 with dorsal ensiform seta situated rather basally.

DISTRIBUTION

Bellenden Ker Range, to the east of Atherton Tableland, north Queensland. Known only from type locality.

HABITAT

Collecting circumstances unknown. This is a high mountain species, collected above 1500m in montane rainforest in June.

ETYMOLOGY

Refers to the occurrence on the summit of Bellenden Ker.

Philipis cooki sp. nov.
(Figs 4A, 11C, 17C)

MATERIAL EXAMINED

HOLOTYPE: QMT13510; ♂, 5.5km N. of Mt. Lewis, via Julatten, NEQ, 1200m, 13 Sept 1981, G. Monteith & D. Cook.

PARATYPES: 1 ♂, 1 ♀, same data (QM); 1 ♂, 2.5km N Mt. Lewis via Julatten, NEQ, 3 Nov 1983, 1040m, DY & GT, Pyr. in RF (QM); 2 ♂, Devils Thumb area 10km NW Mossman, NEQ, 10 Oct 1982, 1000-1180m, GM, DY & GT, Pyr., RF (CBM, QM); 1 ♂, 1 ♀, Mossman Bluff Summit 10km W Mossman, NEQ, 18 Dec 1988, 1300m, GM & GT, Pyr. Trees & Rocks (QM); 1 ♂, 3 ♀, Mt. Demi, 7km SW of Mossman, NEQ, 29 Oct 1983, 1100m, DY & GT, Pyr. in RF (CBM, QM, USNM, ZSM); 4 ♂, Carbine Tableland, NEQ, Plane Crash Site, 1330m, 28 Nov 1990, GM & HJ, Pyr. - Logs & Trees (ANIC, CBM, QM).

DIAGNOSIS

Medium sized to rather large, depressed, with an oblique, s-shaped fascia in posterior half of elytra. Distinguished by distinct transverse impression in anterior third of elytra, narrower base of pronotum, distinctly s-shaped elytral fascia, and longer aedeagus with longer apex, and 4-setose parameres.

DESCRIPTION

Measurements. Length: 2.35-2.70mm; width: 1.10-1.18mm. Ratios: Width pronotum/head: 1.44-1.48; width/length of pronotum: 1.42-1.47; width base/apex of pronotum: 1.45-1.51; width widest diameter/base of pronotum: 1.07-1.09; length/width of elytra: 1.41-1.45.

Colour. Dark piceous, pronotum, base and apex of elytra and posterior part of suture faintly

lighter. Elytra in posterior 2/5 with an oblique, strongly s-shaped, at median end recurrent yellow fascia not attaining suture. Legs yellow, tibiae sometimes faintly darker.

Head. Median antennomeres c. 1.75 x as long as wide. Microreticulation very indistinct and superficial, about isodiametric, even less distinct on vertex. Surface glossy.

Pronotum. Fairly depressed, transverse, widest slightly in front of middle, base much wider than apex. Lateral margin posteriorly feebly rounded or even almost straight, though somewhat oblique. Posterior angles rectangular, faintly produced over lateral part of base. Carina at posterior angle elongate, oblique, slightly incurved. Anterior transverse sulcus rather deep, uninterrupted. Posterior transverse sulcus very deep, interrupted by a large fovea. Anterior lateral seta situated at anterior third of margin. Microreticulation extremely superficial, indistinct, slightly transverse. Surface highly glossy.

Elytra. Fairly elongate, moderately convex, reversely egg-shaped, widest about in middle. Lateral border evenly curved. Disk in anterior third at position of anterior discal seta with conspicuous, rather deep depression. Sutural stria finely punctulate. 2nd stria visible as a row of small punctures, in anterior half even faintly impressed, 3rd-5th striae anteriorly more or less well visible as indistinct rows of extremely fine punctures. Outer striae almost invisible. Intervals absolutely depressed, apart from sutural and 2nd in anterior half. 8th stria deeply impressed, punctate, posteriorly punctate-crenulate, attaining posterior marginal pore. Recurrent striole meeting position of 3rd stria. Anterior discal pore in anterior third, posterior pore posterior 2/5. Microreticulation distinct, though fairly superficial, composed of very transverse meshes, surface rather glossy. Wings fully developed.

Lower surface. Metepisternum c. 1.5 x as long as wide.

Male genitalia. Genital ring slightly asymmetrical, apex rather acute. Aedeagus elongate, rather depressed, lower surface absolutely straight. Apex short, rounded off. Internal sac in middle with two areas of microtrichia. Both parameres 4-setose seta on upper border absent.

Female genitalia. Stylomere 2 with dorsal ensiform seta situated rather basally.

Variation. Apart from minor differences in relative shape of pronotum and elytra and degree of microreticulation, little variation noted.

DISTRIBUTION

Widespread on the Carbine Tableland west of Mossman, north Queensland.

HABITAT

Rainforest on mountains tops above 1000m by pyrethrum knockdown on trees, "on trees and rocks", or "logs and trees". So far collected from September to December.

ETYMOLOGY

For Doug Cook, collector of many specimens of *Philipis*.

Philipis laevigata sp. nov.
(Figs 4B, 11D, 17C)

MATERIAL EXAMINED

HOLOTYPE: QMT13520; ♂, 2km SE Mt. Spurgeon via Mt. Carbine, NEQ, 20 Dec 1988, 1100m, Monteith & Thompson, Pyrethrum/Trees & Logs.

PARATYPE: 1 ♂, 4km NNE Mt. Spurgeon, NEQ, 15 Oct 1991, GM & HJ, QM Berlesate Nr. 855, 16°24'S, 145°13'E, RF, 1250m, Sieved litter (CBM).

DIAGNOSIS

Depressed, with an oblique fascia in posterior half of elytra. Very similar to *P. cooki*, but smaller, pronotum narrower, 2nd stria on elytra deeply impressed and 2nd interval convex, microreticulation of elytra almost absent, aedeagus shorter with larger apex, and both parameres 5-setose.

DESCRIPTION

Measurements. Length: 2.2mm; width: 1.00-1.02mm. Ratios: Width pronotum/head: 1.41-1.44; width/length of pronotum: 1.41-1.45; width base/apex of pronotum: 1.39; width widest diameter/base of pronotum: 1.09-1.11; length/width of elytra: 1.41-1.44.

Colour. Dark piceous, pronotum, base and apex of elytra and posterior part of suture faintly lighter. Elytra in posterior 2/5 with a rather inconspicuous, moderately well delimited, oblique, s-shaped, at median end recurrent yellow fascia attaining about 2nd stria.

Head. Median antennomeres c. 1.5 x as long as wide. Microreticulation rather distinct, though somewhat superficial, less distinct on vertex, about isodiametric. Surface rather glossy.

Pronotum. Fairly depressed, transverse, widest slightly in front of middle, base much wider than apex. Lateral margin posteriorly feebly rounded, though somewhat oblique. Posterior angles rectangular, faintly produced over lateral part of

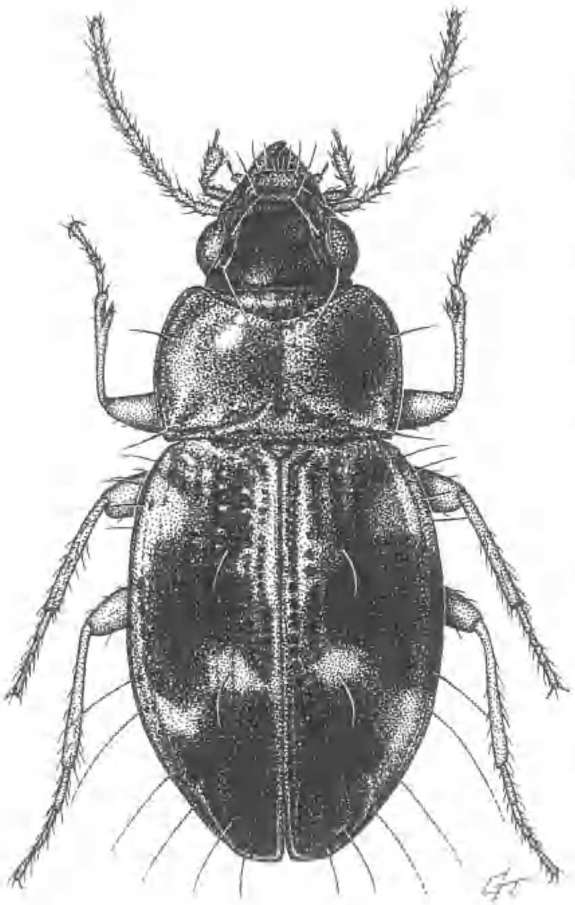

FIG. 3. Dorsal view of *Philipis bicolor* sp. nov.

base. Carina at posterior angle elongate, oblique, slightly incurved. Anterior transverse sulcus rather deep, uninterrupted. Posterior transverse sulcus very deep, interrupted by a large fovea. Anterior lateral seta situated at anterior third of margin. Microreticulation indistinct, highly superficial, slightly transverse. Surface glossy.

Elytra. Fairly elongate, moderately convex, reversely egg-shaped, widest about in middle. Lateral border evenly curved. Disk in anterior third without transverse depression. Sutural stria finely punctulate. 2nd stria apparently also rather deeply impressed (though elytra of type somewhat creased), finely punctate. 3rd-5th striae anteriorly just visible as indistinct rows of extremely fine punctures. Outer striae almost invisible. Sutural and 2nd intervals convex, outer intervals absolutely depressed. 8th stria deeply impressed throughout, almost impunctate, attaining posterior marginal pore. Recurrent striole elongate, oblique, meeting position of 3rd stria. Anterior discal pore in anterior third, posterior pore slightly in front of posterior third. Microreticulation indistinct, highly superficial, composed of irregular, very transverse meshes, surface highly glossy. Wings fully developed.

Lower surface. Metepisternum c. 1.5 x as long as wide.

Male genitalia. Genital ring asymmetrically triangular, apex rather obtuse. Aedeagus short and compact, lower surface straight. Apex short, wide, widely rounded off. Internal sac in middle with two areas of microtrichia. Both parameres 5-setose. Female genitalia unknown.

Variation. Very little variation noted.

DISTRIBUTION

Mt. Spurgeon and vicinity, Carbine Tableland, north Queensland.

HABITAT

Collected by pyrethrum knockdown on mossy tree trunks and logs and by sieving litter in montane rainforest above 1100m. Collected October and December.

ETYMOLOGY

Refers to the smooth, glossy elytra.

Philipis heatherae sp. nov.
(Figs 11E, 18A)

MATERIAL EXAMINED

HOLOTYPE: QMT13521; ♀, 17°03'S x 145°42'E Isley Hills, NEQ, 1050m 30 Nov 1993 Monteith & Janetzki, Pyrethrum/trees & rocks.

DIAGNOSIS

Medium-sized, depressed, with an oblique fascia in posterior half of elytra. Distinguished by wide base of pronotum that is almost as wide as diameter of pronotum in middle, by fascia of elytra not s-shaped, and by 2nd interval not impressed and 3rd-5th intervals indistinct.

DESCRIPTION

Measurements. Length: c. 2.35mm; width: c. 1.08mm. Ratios: Width pronotum/head: 1.41; width/length of pronotum: 1.46; width base/apex of pronotum: 1.50; width widest diameter/base of pronotum: 1.03; length/width of elytra: 1.42.

Colour. Dark piceous, suture and lateral margins of elytra faintly lighter. Elytra in posterior 2/5 with a moderately conspicuous, fairly well delimited, oblique, faintly s-shaped, at median

end recurrent yellow fascia attaining about 2nd stria.

Head. Median antennomeres c. 1.5 x as long as wide. Microreticulation rather distinct, though somewhat superficial, less distinct on vertex, about isodiametric. Surface rather glossy.

Pronotum. Fairly depressed, transverse, quadrate, widest slightly in front of middle, though barely narrowed to base, base much wider than apex. Lateral margin posteriorly almost straight or even feebly concave, faintly oblique. Posterior angles rectangular, faintly produced over lateral part of base. Carina at posterior angle elongate, oblique, slightly incurved. Anterior transverse sulcus rather deep, uninterrupted. Posterior transverse sulcus very deep, interrupted by a large fovea. Anterior lateral seta situated at anterior third of margin. Disk with some shallow, transverse wrinkles in middle, in anterior two fifth on either side with a shallow, punctiform impression. Microreticulation rather indistinct, superficial, slightly transverse. Surface glossy.

Elytra. Fairly elongate, moderately convex, reversely egg-shaped, widest about in middle. Lateral border evenly curved. Disk in anterior third with very slight transverse depression. Sutural stria finely punctulate. 2nd stria barely impressed, finely punctate. 3rd-5th striae just visible as indistinct rows of very spaced and fine punctures. Outer striae almost invisible. Sutural interval convex, 2nd interval barely convex, outer intervals absolutely depressed. 8th stria deeply impressed throughout, finely punctate, attaining posterior marginal pore. Recurrent striole elongate, oblique, meeting position of 3rd stria. Anterior discal pore in anterior third, posterior pore slightly in front of posterior third. Microreticulation indistinct, highly superficial, composed of irregular, transverse meshes, surface highly glossy. Wings fully developed. Variation unknown.

Lower surface. Metepisternum c. 1.5 x as long as wide.

Genitalia. Male unknown. Female stylomere 2 with dorsal ensiform seta situated rather basally.

DISTRIBUTION

Isley Hills, south of Cairns, north Queensland. Known only from type locality.

HABITAT

Collected by pyrethrum knockdown on mossy trees and rocks in montane rainforest at 1050m. Captured end of November.

ETYMOLOGY

For Heather Janetzki, Queensland Museum, collector of many species of *Philipis*.

Philipis picea sp. nov.
(Figs 11F, 18A)

MATERIAL EXAMINED

HOLOTYPE: QMT13522; ♀, Mossman Bluff Track, 9km W Mossman, NEQ, 20 Dec 1989, 860m, Monteith & Thompson, Pyrethrum (Site 6).

DIAGNOSIS

Medium sized, rather elongate and fairly depressed, winged. Easily distinguished by depressed shape and uniform, piceous colour without any elytral pattern. Distinguished from *P. castanea* by wide base of pronotum and absence of transverse depression in anterior third of elytra.

DESCRIPTION

Measurements. Length: 2.50mm; width: 1.16mm. Ratios: Width pronotum/head: 1.40; width/length of pronotum: 1.51; width base/apex of pronotum: 1.57; width widest diameter/base of pronotum: 1.01; length/width of elytra: 1.37.

Colour. Very dark piceous, lateral borders of pronotum and elytra and elytral suture posteriorly faintly lighter. Legs dark yellow, femora slightly infuscate.

Head. Median antennomeres c. 1.6 x as long as wide. Microreticulation on labrum, clypeus, and frons fairly distinct, though somewhat superficial, on vertex reduced, about isodiametric. Surface moderately glossy.

Pronotum. Fairly depressed, transverse, widest in front of middle, base much wider than apex. Lateral margin posteriorly very faintly concave, barely oblique, hence pronotum not perceptibly narrowed to posterior angles. Posterior angles rectangular. Carina at posterior angle elongate, oblique, slightly incurved. Anterior transverse sulcus comparatively shallow, uninterrupted. Posterior transverse sulcus very deep, interrupted by a rather large fovea. Anterior lateral seta situated at anterior third of margin. Microreticulation absent, surface highly glossy.

Elytra. Fairly elongate, moderately convex, reversely egg-shaped, widest slightly in front of middle. Lateral border evenly curved. Disk without transverse depression. Sutural stria finely punctulate. All other striae visible as rows of rather fine punctures, though becoming finer laterally and towards apex. 2nd stria in anterior half faintly impressed. Only sutural interval convex, others depressed. 8th stria deeply impressed,

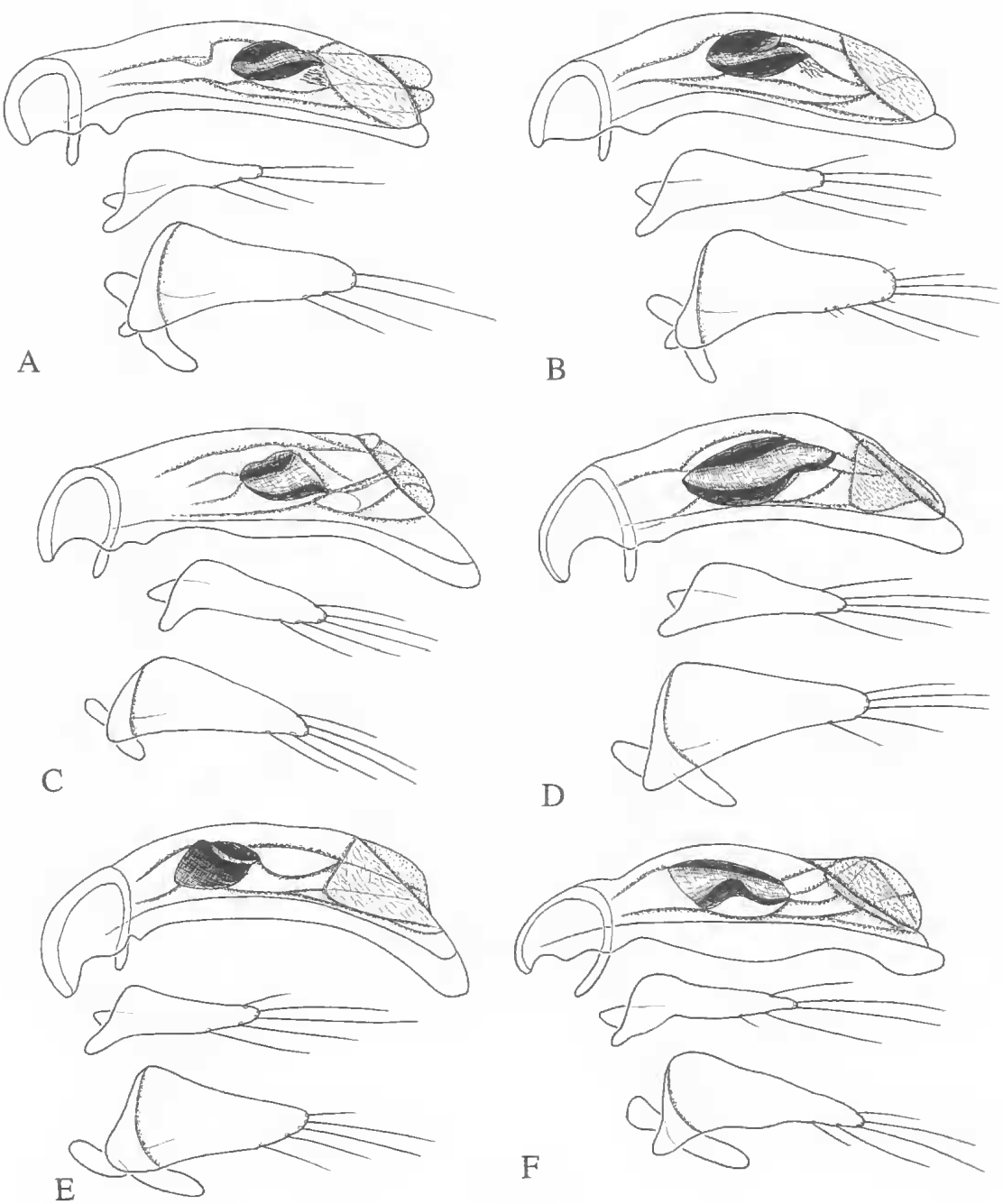

FIG. 4. ♂ genitalia. A, *Philipis cooki* sp. nov. B, *P. laevigata* sp. nov. C, *P. castanea* sp. nov. D, *P. unicolor* sp. nov. E, *P. atra* sp. nov. F, *P. ruficollis* sp. nov.

TABLE 1. Summary of measures and ratios of *Philipis*. l: length (mm); w: width (mm); w p/h: ratio of width pronotum/head; w/l p: ratio of width/length of pronotum; b/a p: ratio of width of base/apex of pronotum; d/b p: ratio of widest diameter/base of pronotum; l/w e: ratio of length/width of elytra.

Philipis species	l	w	w p/h	w/l p	b/a p	d/b p	l/w e
quadraticollis	2.70-2.80	1.20-1.25	1.48-1.49	1.55-1.58	1.57-.160	0.99	1.43
alticola	2.75	1.24	1.41	1.45	1.48	1.04	1.45
cooki	2.35-2.70	1.10-1.18	1.44-1.48	1.42-1.47	1.45-1.51	1.07-1.09	1.41-1.45
laevigata	2.20	1.00-1.02	1.41-1.44	1.41-1.45	1.39	1.09-1.11	1.41-1.44
heatherae	2.35	1.08	1.41	1.46	1.50	1.03	1.42
picea	2.50	1.16	1.40	1.51	1.57	1.01	1.37
castanea	2.15-2.50	0.95-1.15	1.40-1.45	1.48-1.51	1.50-1.53	1.05-1.07	1.36-1.38
unicolor	1.85-2.25	0.90-1.10	1.54-1.58	1.56-1.60	1.45-1.50	1.10-1.13	1.28-1.30
atra	2.45-2.60	1.12-1.20	1.55-1.58	1.49-1.53	1.39-1.43	1.11-1.13	1.37-1.38
ruficollis	2.35-2.50	1.12-1.15	1.43-1.44	1.42-1.44	1.47-1.49	1.06-1.08	1.37-1.41
inermis	1.95-2.00	0.89-0.90	1.43-1.44	1.32-1.34	1.31-1.33	1.09-1.10	1.36-1.38
reticulata	2.20	1.02	1.45	1.52	1.45	1.07	1.32
striata	2.15-2.45	1.00-1.15	1.50-1.53	1.56-1.58	1.50-1.54	1.03-1.07	1.32-1.34
planicola	2.10-2.20	1.00-1.05	1.48-1.49	1.50-1.54	1.54-1.55	0.97-0.98	1.30-1.31
spurgeoni	2.28	1.08	1.55	1.54	1.44	1.07	1.30
trunci	2.00-2.25	0.95-1.03	1.51-1.56	1.51-1.53	1.38-1.44	1.09-1.13	1.28-1.31
tribulationis	1.95-2.15	0.92-0.98	1.48-1.54	1.50-1.53	1.40-1.42	1.08-1.11	1.31-1.33
thompsoni	2.15-2.30	1.00-1.10	1.51-1.55	1.46-1.52	1.45-1.49	1.08-1.11.	1.33-1.34
vicina	2.20	1.00	1.52	1.55	1.40	1.10	1.33
laevis	2.05-2.30	1.04-1.12	1.58-1.62	1.43-1.49	1.41-1.45	1.12-1.15	1.24-1.28
sulcata	2.05-2.50	0.95-1.20	1.58-1.64	1.53-1.57	1.48-1.57	1.11-1.15	1.27-1.31
frerei	2.05-2.45	1.00-1.15	1.60-1.64	1.44-1.51	1.42-1.48	1.11-1.19	1.31-1.34
subtropica	2.30-2.80	1.00-1.25	1.54-1.64	1.42-1.47	1.43-1.47	1.13-1.15	1.35-1.36
alutacea	2.25-2.45	1.05-1.12	1.64-1.68	1.46-1.49	1.63-1.67	1.04-1.06	1.32-1.35
rufescens	2.15-2.45	1.02-1.10	1.56-1.63	1.36-1.45	1.38-1.41	1.12-1.18	1.37-1.38
perstriata	2.05	0.90	1.64	1.41	1.37	1.17	1.39
ellioti	2.00-2.15	0.90-1.00	1.50-1.53	1.38-1.46	1.28-1.43	1.12-1.16	1.35-1.41
agnicapitis	1.85-2.30	0.85-1.05	1.50-1.57	1.39-1.42	1.34-1.37	1.13-1.15	1.34-1.39
picta	2.18-2.35	1.02-1.04	1.48-1.51	1.45-1.49	1.35-1.40	1.12-1.16	1.31-1.34
bicolor	2.00-2.45	0.92-1.15	1.50-1.55	1.53-1.61	1.44-1.49	1.07-1.09	1.32-1.36
geoffreyi	2.12-2.16	1.02-1.04	1.51-1.55	1.55-1.57	1.42-1.46	1.08-1.09	1.29-1.31
minor	2.00	0.96	1.45	1.47	1.34	1.11	1.35
sinuata	2.60-2.75	1.20-1.30	1.65-1.73	1.51-1.56	1.51-1.59	1.09-1.11	1.34-1.36
distinguenda	2.60-2.65	1.18-1.24	1.59-1.60	1.45-1.47	1.45-1.47	1.10-1.12	1.38-1.41
lustrans	2.20-2.50	1.00-1.16	1.56-1.62	1.51.1.57	1.46-1.51	1.09-1.13	1.33-1.37

finely punctate, becoming shallower anteriorly, attaining posterior marginal pore. Recurrent striole elongate, oblique, meeting 3rd stria. Anterior discal pore in anterior third, posterior pore slightly in front of posterior 2/5. Microreticulation absent, surface highly glossy. Wings fully developed. Variation unknown.

Lower surface. Metepisternum elongate, c. 1.5 x as long as wide.

Genitalia. Male unknown. Female stylomere 2 with dorsal ensiform seta situated rather basally.

DISTRIBUTION

Mountains west of Mossman, north Queensland. Known so far from type locality only.

HABITAT

Collected by pyrethrum knockdown on mossy tree trunks in montane rainforest at 850m. Collected December only.

ETYMOLOGY

Refers to the piceous colour.

Philipis castanea sp. nov.
(Figs 4C, 12A, 18A)

MATERIAL EXAMINED

HOLOTYPE: QMT13523; ♂, Thornton Peak summit, via Daintree, NEQ, 24-27 Sept 1984, G. B. & S. R. Monteith/QM Berleseate No. 662, Rainforest, 1100-1300m, sieved litter & moss.

PARATYPES: 2 ♂, 4 ♀, Thornton Peak, 11km NE Daintree, NEQ, 1000-1200m, 30 Oct-1 Nov 1983, GM, DY & GT (ANIC, CBM, QM, ZSM); 2 ♂, 4 ♀, Thornton Peak via Daintree, NEQ, 1000-1300m, 20-22 Sept 1981, GM & DC (CBM, QM, USNM), 1 ♂, , 4.5-5.0km W of Cape Tribulation, Top Camp, NEQ, 760-780m, 27 Sept-7 Oct 1982, GM, DY & GT (QM); 2 ♂, 1 ♀, 4.5-5.0km W of Cape Tribulation, Top Camp, NEQ, 1-6 Oct 1982, 760-780m, GM, DY & GT, Pyr., RF (QM); 1 ♀, , 5.0km W of Cape Tribulation, NEQ, (Site 10), 28 Sept 1982, 780m, GM, DY & GT, Pyr., RF (QM).

DIAGNOSIS

Medium sized, rather elongate and fairly depressed, winged. Easily distinguished by depressed shape and uniform, chestnut brown colour without any elytral pattern. Distinguished from *P. picea* by narrower base of pronotum and presence of a transverse depression in anterior third of elytra.

DESCRIPTION

Measurements. Length: 2.15-2.50mm; width: 0.95-1.15mm. Ratios: Width pronotum/head: 1.40-1.45; width/length of pronotum: 1.48-1.51; width base/apex of pronotum: 1.50-1.53; width widest diameter/base of pronotum: 1.05-1.07; length/width of elytra: 1.36-1.38.

Colour. Chestnut brown, head piceous, elytral suture posteriorly faintly lighter. Legs yellow, tibiae sometimes faintly darker.

Head. Median antennomeres c. 1.75 x as long as wide. Microreticulation present on labrum, clypeus, and frons, but very indistinct and superficial, about isodiametric, visible only under high magnification. Surface glossy.

Pronotum. Fairly depressed, transverse, widest in front of middle, base much wider than apex. Lateral margin posteriorly feebly rounded or even almost straight, though somewhat oblique. Posterior angles rectangular. Carina at posterior angle elongate, oblique, slightly incurved. Anterior transverse sulcus comparatively shallow, uninterrupted. Posterior transverse sulcus very deep, interrupted by a rather large fovea. Anterior lateral seta situated at anterior third of margin. Microreticulation absent, surface highly glossy.

Elytra. Fairly elongate, moderately convex, reversely egg-shaped, widest slightly in front of middle. Lateral border evenly curved. Disk in anterior third at position of anterior discal seta with shallow transverse depression. Sutural stria punctulate. 2nd stria visible as a row of small punctures, in anterior half even faintly impresed, 3rd-5th striae anteriorly more or less well visible as indistinct rows of extremely fine punctures. Outer striae absent. Intervals, apart from sutural and 2nd in anterior half, absolutely depressed. 8th stria deeply impressed, punctate, posteriorly punctate-crenulate, attaining posterior marginal pore. Recurrent striole elongate, oblique, meeting position of 3rd stria. Anterior discal pore in anterior third, posterior pore behind middle. Microreticulation absent, except for the very apex, surface highly glossy. Wings fully developed.

Lower surface. Metepisternum c. 1.5 x as long as wide.

Male genitalia. Genital ring regularly triangular, apex rather acute. Aedeagus large, lower surface slightly bisinuate, apex stout, elongate, slightly bent down, at tip rounded off. Both parameres 5-setose.

Female genitalia. Stylomere 2 with dorsal ensiform seta situated rather basally.

Variation. Apart from some variation of shape of pronotum and distinctness of elytral striae, little variation noted.

DISTRIBUTION

Thornton Peak and adjacent uplands above Cape Tribulation, north of Daintree, north Queensland.

HABITAT

A montane species, occurring in rainforest above 750m. Collected by pyrethrum knockdown on mossy tree trunks and by Berlese extraction of litter and moss. Collected only in the period of September-November.

ETYMOLOGY

Refers to the castaneous colour of upper surface.

Philipis unicolor sp. nov.
(Figs 4D, 12B, 18A)

MATERIAL EXAMINED

HOLOTYPE: QMT13536; ♂, Bellenden Ker, Cableway Tower No 3, NEQ, 1000m, Pyrethrum/trees, 25 Sept 1981, G. Monteith.

PARATYPES: 2 ♂, 10 ♀, same data (ANIC, CBM, QM, USNM, ZSM); 1 ♂, 5 ♀, Bellenden Ker Range, Cable Tower 3, NEQ, 1054m, 17 Oct-5 Nov 1981, EW/QM, Pyr. (CBM, QM); 1 ♀, Bellenden Ker Range, Cable Tower 3, NEQ, 1054m, 17-24 Oct 1981, EW/QM, Pyr. on logs, stones and tree trunks (QM); 1 ♀, Bartle-Frere, NW Peak, NEQ, 1440m, Pyr. on mossy rocks 24 Sept 1981, GM (QM); 2 ♂, Mt. Bartle Frere, NEQ, West Side, 1050m, 8 Dec 1990, GM, GT & RS, Pyr.-trees & rocks (QM); 1 ♀, Bell Peak North 10km E Gordonvale, NEQ, 13 Oct 1982, 900-1000m, GM, DY & GT, Pyr., RF (QM).

DIAGNOSIS

Small, piceous, unpatterned, short and highly convex, distinguished from *P. atra* sp. nov. by smaller size (length), lighter colour, evenly convex posterior part of lateral margin of pronotum, shorter elytra, and shorter and wider apex and evenly rounded lower surface of aedeagus.

DESCRIPTION

Measurements. Length: 1.85-2.25mm; width: 0.9-1.1mm. Ratios: Width pronotum/head: 1.54-1.58; width/length of pronotum: 1.56-1.60; width base/apex of pronotum: 1.45-1.50; width widest diameter/base of pronotum: 1.10-1.13; length/width of elytra: 1.28-1.30.

Colour. Piceous, sutural interval and marginal channel of elytra reddish. Elytra without pattern. Antenna yellow. Legs yellow, femora reddish to reddish-brown.

Head. Median antennomeres c. 1.35 x as long as wide. Microreticulation on frons barely visible, on labrum and anterior border of clypeus distinct, isodiametric. Surface glossy.

Pronotum. Moderately convex, transverse, widest in middle, base much wider than apex. Lateral margin evenly curved, though slightly more curved to apex than to base. Posterior angles rectangular, faintly produced over lateral part of base. Carina at posterior angle elongate, oblique, slightly incurved. Anterior transverse sulcus comparatively shallow, uninterrupted. Posterior transverse sulcus deep, interrupted by a large fovea. Anterior lateral seta situated slightly behind anterior third of margin. Microreticulation absent, surface highly glossy.

Elytra. Short and highly convex, lateral border evenly curved, widest in middle. Lateral margin extremely finely serrrate and pilose. Sutural stria in anterior half coarsely punctate, posteriorly impunctate. 2nd stria in basal half indicated as a row of rather coarse punctures, but stria beginning only at some distance from base, posteriorly almost reduced. Outer striae composed of extremely fine rows of delicate punctures, posteriorly almost reduced, difficult to recognize. Only sutural interval and 2nd interval in basal third, slightly convex. 8th stria deeply impressed, loosely punctate, not attaining posterior marginal pore. Recurrent striole rather short, markedly oblique, only anteriorly shortly incurved and hardly meeting position of 3rd stria. Anterior discal pore in anterior third, posterior pore slightly behind middle. Microreticulation absent, surface highly glossy. Wings absent.

Lower surface. Metepisternum about as long as wide.

Male genitalia. Genital ring almost symmetrical, apex rather wide. Aedeagus short and compact, lower surface slightly and evenly curved. Apex short, thick, rounded off. Both parameres 5-setose.

Female genitalia. Stylomere 2 with dorsal ensiform seta situated rather basally.

Variation. Apart from some, partly sexual, differences of size, and some differences of relative shape of pronotum, little variation noted.

DISTRIBUTION

Bellenden Ker Range and nearby Malbon Thompson Range, east of Atherton Tableland, north Queensland.

HABITAT

Collected by pyrethrum knockdown of mossy trees and rocks in montane rainforest above 900m, in the period of September to November.

ETYMOLOGY

Refers to the unpatterned dorsal surface.

Philipis atra sp. nov.
(Figs 4E, 12C, 17A)

MATERIAL EXAMINED

HOLOTYPE: QMT13553; ♂, 20°50'S, 148°34'E Mt. Macartney, CEQ, 19 Nov 1992, 900m Monteith, Thompson & Janetzki, Pyrethrum.

PARATYPES: 2 ♀, same data (CBM, QM).

DIAGNOSIS

Medium sized, black, unpatterned, short and highly convex, distinguished from *P. unicolor* sp. nov. by larger size (length 2.45mm), darker col-

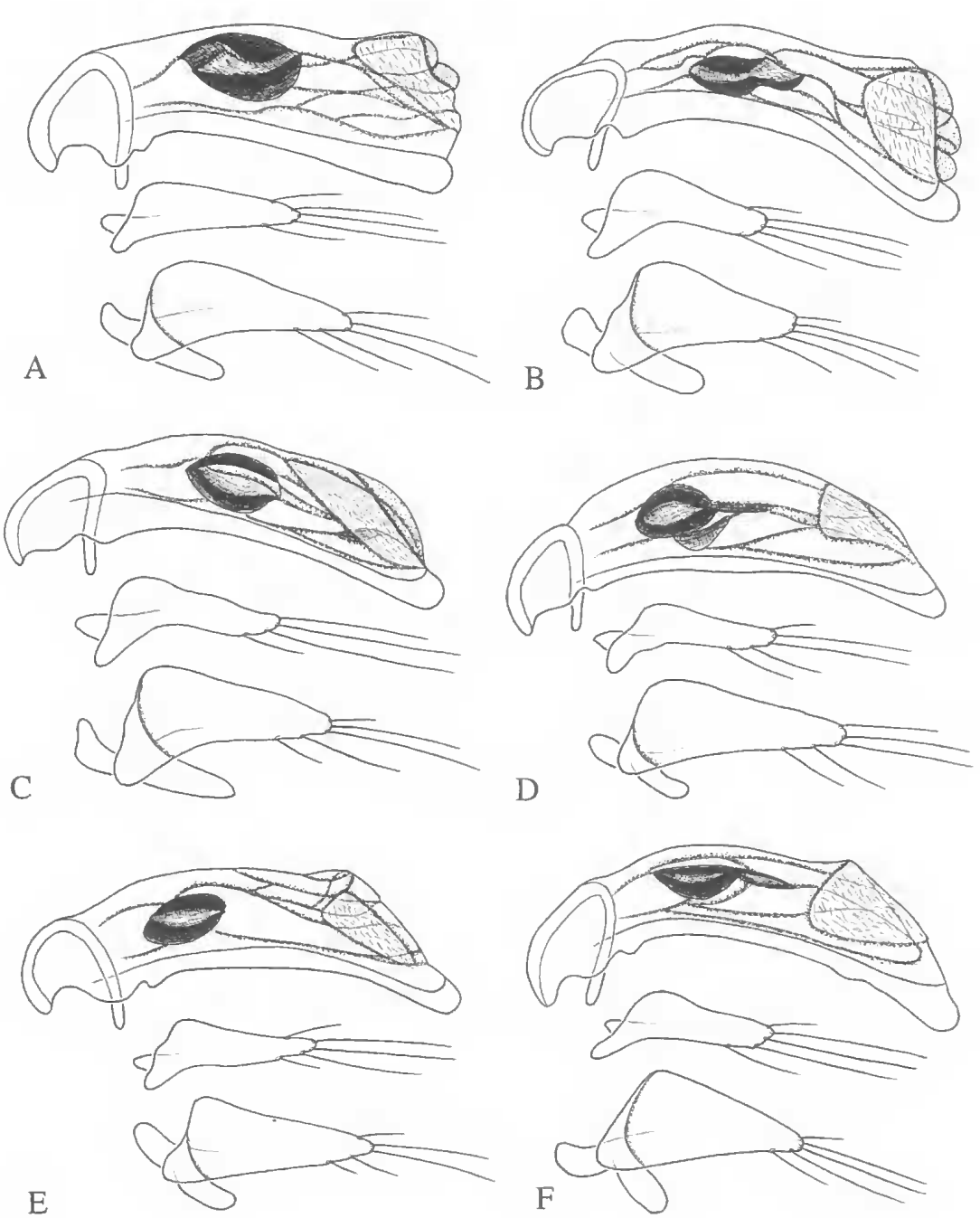

FIG. 5. ♂ genitalia. A, *Philipis inermis* sp. nov. B, *P. striata* sp. nov. C, *P. planicola* sp. nov. D, *P. trunci* (Darlington). E, *P. tribulationis* sp. nov. F, *P. thompsoni* sp. nov.

our, irregularly convex posterior part of lateral margin of pronotum, longer elytra, and longer and narrower apex and basally straight lower surface of aedeagus.

DESCRIPTION

Measurements. Length: 2.45-2.60mm; width: 1.12-1.20mm. Ratios: Width pronotum/head: 1.55-1.58; width/length of pronotum: 1.49-1.53; width base/apex of pronotum: 1.39-1.43; width widest diameter/base of pronotum: 1.11-1.13; length/width of elytra: 1.37-1.38.

Colour. Completely black or very dark piceous-black. Elytra without pattern. Legs dirty yellow, femora barely darker.

Head. Median antennomeres slightly <1.5 x as long as wide. Microreticulation on frons rather superficial, on labrum and anterior border of clypeus distinct, isodiametric. Surface glossy.

Pronotum. Moderately convex, transverse, widest in middle, base much wider than apex. Lateral margin anteriorly evenly curved, though posteriorly with a faint compression behind middly, and near basal angles curved in. Posterior angles rectangular, at apex obtuse, not produced over lateral part of base. Carina at posterior angle elongate, oblique, slightly incurved. Anterior transverse sulcus comparatively shallow, uninterrupted. Posterior transverse sulcus deep, interrupted by a large fovea. Anterior lateral seta situated slightly behind anterior third of margin. Microreticulation absent, surface highly glossy.

Elytra. Rather short and highly convex, egg-shaped, widest in middle. Lateral border evenly curved, extremely finely serrate and pilose. Sutural stria in anterior half finely punctate, posteriorly impunctate, 2nd stria in basal half slightly impressed, finely punctate, but stria beginning only at some distance from base, becoming weaker towards apex. Outer striae gradually finer towards lateral margin, striae composed of rows of fine punctures, the outer ones posteriorly almost reduced, difficult to recognize. Only sutural interval and 2nd interval in basal half, slightly convex. 8th stria deeply impressed, loosely punctate, just attaining posterior marginal pore. Recurrent striole rather short, markedly oblique, anteriorly barely incurved, not attaining position of 3rd stria. Anterior discal pore situated in anterior third, posterior pore in posterior third. Microreticulation absent, except for near apex, surface highly glossy. Wings present.

Lower surface. Metepisternum slightly longer than wide.

Male genitalia. Genital ring almost symmetrical, apex rather wide. Aedeagus short and compact, lower surface basally straight, then evenly curved. Apex short, rather compact, rounded off. Both parameres 5-setose.

Female genitalia. Stylomere 2 with very stout dorsal ensiform seta situated about medially.

Variation. Apart from some minor differences in size and relative shape of pronotum, little variation noted.

DISTRIBUTION

Mt. Macartney north of Eungella National Park, central eastern Queensland. Known only from this mountain top.

HABITAT

Collected in montane rainforest above 900m by pyrethrum knockdown, on mossy tree trunks. Collected November only.

ETYMOLOGY

Refers to the unicolorous black surface.

Philipis ruficollis sp. nov.
(Figs 4F, 12D, 18B)

MATERIAL EXAMINED

HOLOTYPE: QMT13555; ♂, Mt. Finnigan, 850-1100m, 37km S Cooktown, NEQ, 19-22 Apr 1982, RF Monteith, Yeates & Cook.

PARATYPES: 1 ♂, same data (CBM); 1 ♀ Mt. Finnigan, 1100m, 37km S Cooktown, NEQ, 20 Dec 1982, LR, Pyr. (QM); 1 ♂, Mt. Finnigan Summit via Helenvale, NEQ, 3-5 Dec 1990, 1050m, GM, GT, DC, RS & LR (QM); 1 ♂, Mt. Finnigan Summit via Helenvale, NEQ, 28-30 Nov 1985, 1100m, GM, DC & LR (QM); 1 ♂, Mt. Finnigan Summit via Helenvale, NEQ, 28 Nov 1985, 1100m, GM & DC, Pyr/RF (QM); 2 ♂, Mt. Finnigan Summit via Helenvale, NEQ, 3-5 Dec 1990, 1050m, GM, RS, LR & GT, Pyr. (ANIC, QM).

DIAGNOSIS

Medium sized, moderately convex, distinguished by rufous pronotum, almost transverse elytral fascia not s-shaped, and strongly bisinuate lower surface of aedeagus.

DESCRIPTION

Measurements. Length: 2.35-2.50mm; width: 1.12-1.15mm. Ratios: Width pronotum/head: 1.43-1.44; width/length of pronotum: 1.42-1.44; width base/apex of pronotum: 1.47-1.49; width widest diameter/base of pronotum: 1.06-1.08; length/width of elytra: 1.37-1.41.

Colour. Head and elytra dark piceous, pronotum contrastingly reddish. Elytra with an ill-de-

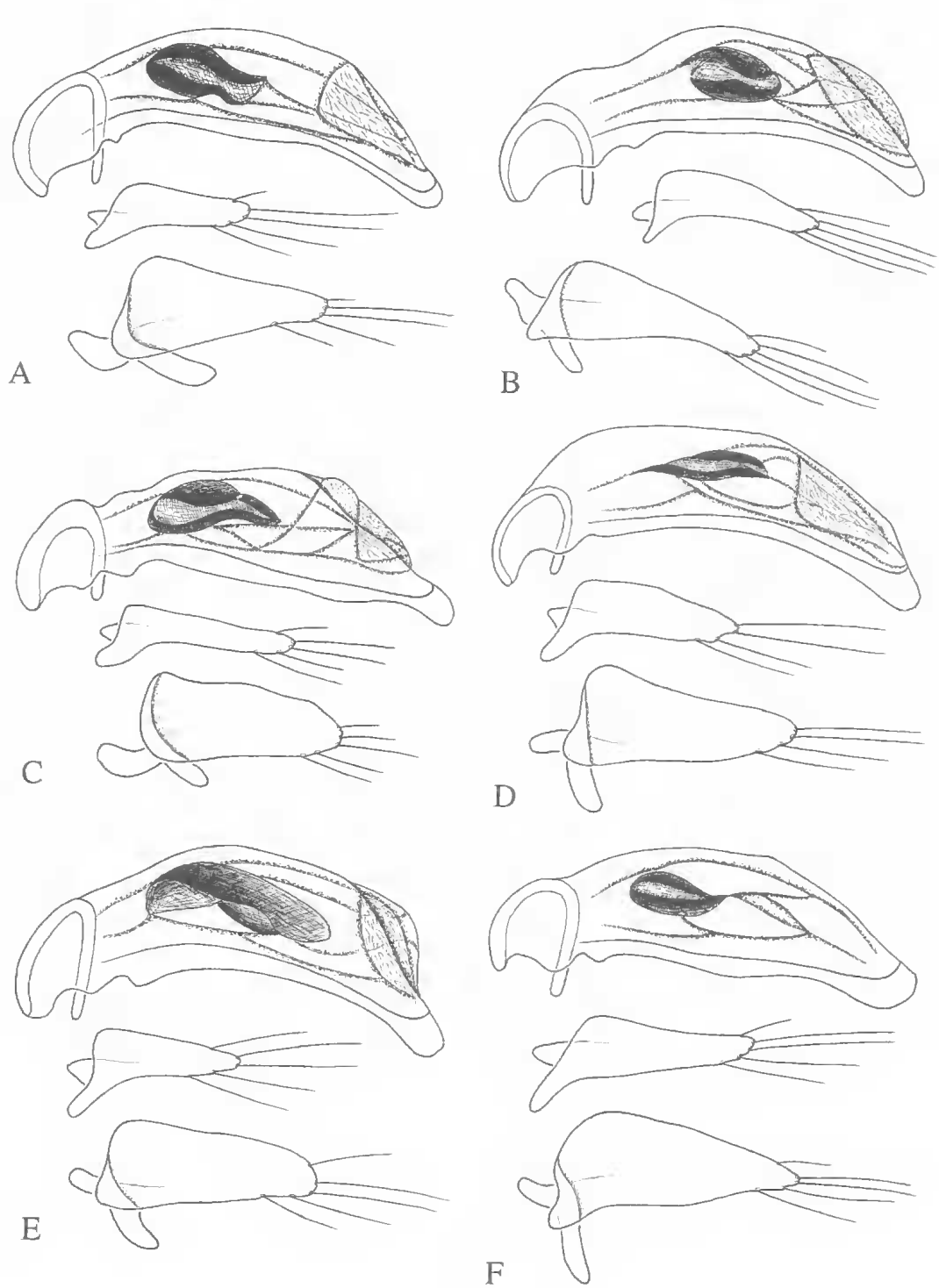

FIG. 6. ♂ genitalia. A, *Philipis vicina* sp. nov. B, *P. laevis* sp. nov. C, *P. sulcata* sp. nov. D, *P. frerei* sp. nov. E, *P. subtropica* sp. nov. F, *P. alutacea* sp. nov.

fined, somewhat transverse spot in posterior 2/5 not reaching suture nor lateral border, and suture posteriorly reddish. Legs yellow.

Head. Median antennomeres c. 1.3 x as long as wide. Microreticulation visible on frons, though rather superficial, almost reduced on vertex, about isodiametric. Surface rather glossy.

Pronotum. Rather depressed, transverse, widest slightly in front of middle, base much wider than apex. Lateral margin posteriorly almost straight, though somewhat oblique. Posterior angles rectangular, feebly produced over lateral part of base. Marginal Lateral channel posteriorly slightly punctate. Carina at posterior angle elongate, oblique, slightly incurved. Anterior transverse sulcus rather shallow, slightly interrupted or at least becoming shallower. Posterior transverse sulcus very deep, interrupted by a rather small, inconspicuous fovea. Anterior lateral seta situated slightly behind anterior third of margin. Microreticulation completely absent, surface highly glossy.

Elytra. Moderately elongate, fairly convex, reversely egg-shaped, widest well in front of middle. Lateral border evenly curved Sutural stria crenulate. Other striae in anterior half well developed as rows of fairly coarse punctures, though 6th and 7th striae very delicate. All striae posteriorly reduced. Only sutural interval convex. 8th stria deeply impressed, punctate, attaining posterior marginal pore. Recurrent striole elongate, meeting position of 3rd stria. Anterior discal pore in anterior third, posterior pore slightly behind posterior 2/5. Microreticulation on disk completely absent, but present as superficial transverse meshes at apex. Surface of disk highly glossy. Wings fully developed. Little variation noted.

Lower surface. Metepisternum c. 1.3 x as long as wide.

Male genitalia. Genital ring triangular, slightly asymmetrical, apex rather acute. Aedeagus rather short and compact, lower surface remarkably bisinuate, apex slightly bent down, short, widely rounded off. Both parameres 5-setose.

Female genitalia. Stylomere 2 with dorsal ensiform seta situated rather medially.

DISTRIBUTION

Mt. Finnigan south of Cooktown, north Queensland. Known only from that mountain top.

HABITAT

Collected by pyrethrum knockdown on mossy tree trunks in montane rainforest above 850m. Collected April and November-December.

ETYMOLOGY

Refers to the red colour of pronotum.

Philipis inermis sp. nov.
(Figs 5A, 12E, 18B)

MATERIAL EXAMINED

HOLOTYPE: QMT13561; ♂, Mt. Finnigan Summit. NEQ, 29 Nov 1985, G. Monteith, QM Berlesate No. 699, 15°48S 145°17E, moss on trees.

PARATYPES: 1 ♂, Mt. Finnigan, 1100m, 37km S Cooktown, NEQ, 20 Dec 1982, LR, Pyr. (CBM).

DIAGNOSIS

Small, narrow, distinguished by small size, narrow pronotum, and apical elytral fascia not s-shaped.

DESCRIPTION

Measurements. Length: 1.95-2.0mm; width: 0.89-0.90mm. Ratios: Width pronotum/head: 1.43-1.44; width/length of pronotum: 1.32-1.34; width base/apex of pronotum: 1.31-1.33; width widest diameter/base of pronotum: 1.09-1.10; length/width of elytra: 1.36-1.38.

Colour. Very dark piceous to almost black, pronotum faintly lighter, posterior half of elytral suture reddish. Elytra with a moderately well-defined, slightly transverse, dark yellow or light reddish spot in posterior 2/5 medially reaching almost to 2nd stria. Legs reddish-piceous, apex of femora and tibiae, and tarsi yellow. Lower surface piceous, anteriorly even slightly darker.

Head. Median antennomeres c. 1.15 x as long as wide. Microreticulation distinct on labrum and clypeus, becoming more superficial on frons, almost absent on vertex, anteriorly about isodiametric, posteriorly slightly transverse. Surface fairly glossy.

Pronotum. Comparatively narrow, convex, widest about in middle, base not much wider than apex. Lateral margin evenly curved, but slightly less so posteriorly. Posterior angles subrectangular, slightly obtuse, not produced over lateral part of base. Carina at posterior angle comparatively short, oblique, slightly incurved. Anterior transverse sulcus moderately deep, barely interrupted. Posterior transverse sulcus deep, slightly interrupted. Anterior lateral seta situated well behind anterior third of margin. Microreticulation super-

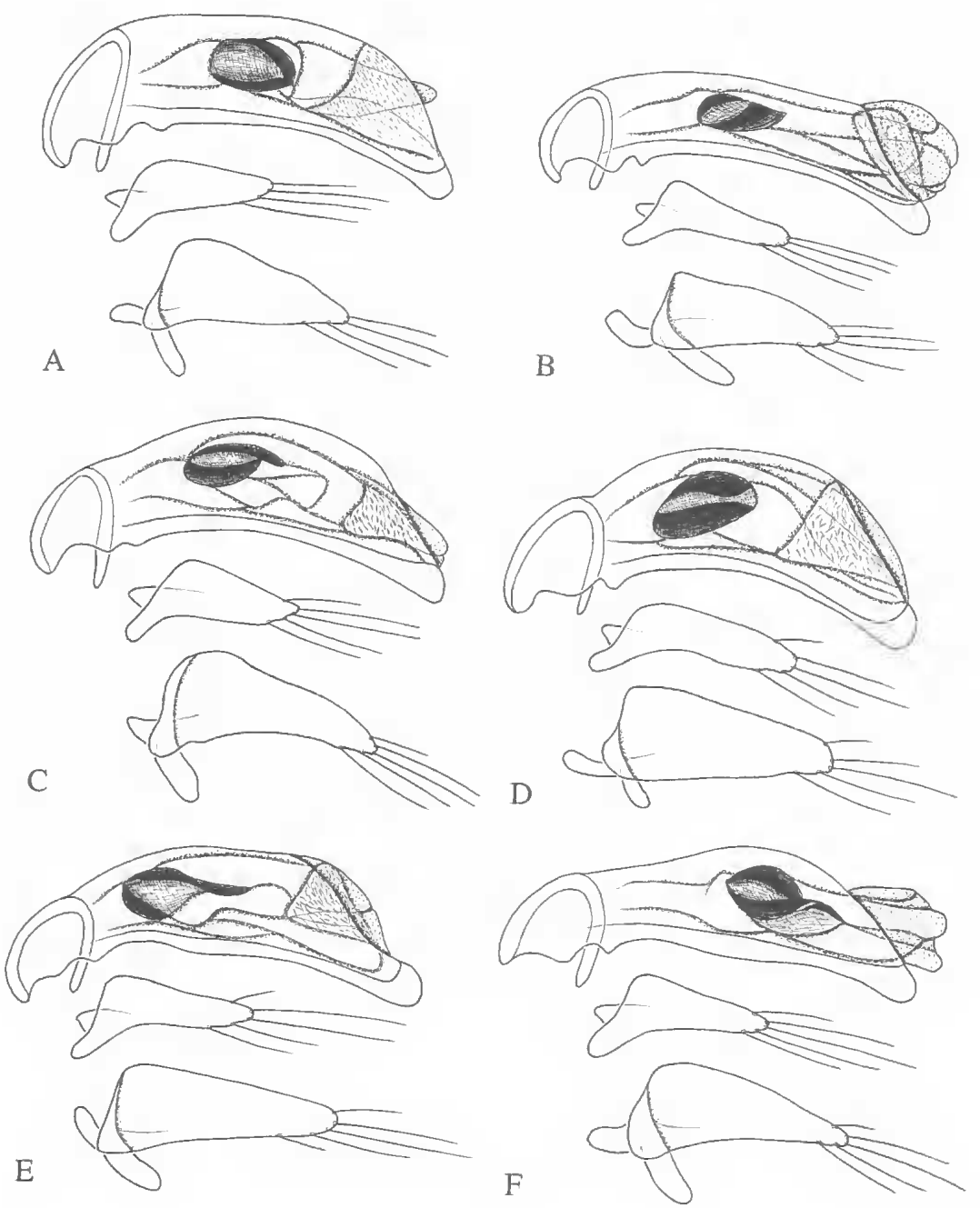

Fig. 7. ♂ genitalia. A, *Philipis rufescens* sp. nov. B, *P. ellioti* sp. nov. C, *P. agnicapitis* sp. nov. D, *P. picta* sp. nov. E, *P. bicolor* sp. nov. F, *P. geoffreyi* sp. nov.

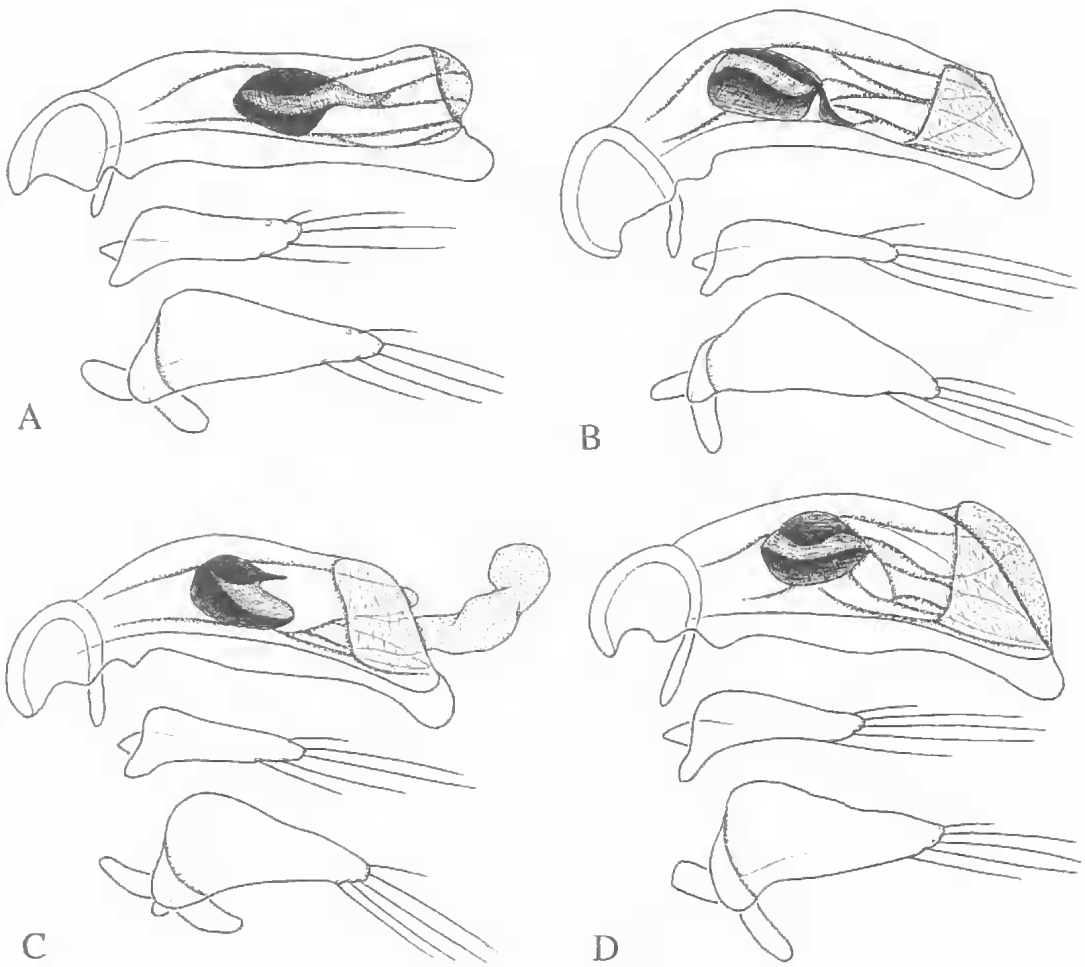

FIG. 8. ♂ genitalia. A, *Philipis minor* sp. nov. B, *P. sinuata* sp. nov. C, *P. distinguenda* sp. nov. D, *P. lustrans* sp. nov.

ficial, though visible, slightly transverse, surface fairly glossy.

Elytra. Short, convex, egg-shaped, widest about in middle. Lateral border evenly curved, finely serrate and pilose throughout. Sutural stria in basal half punctate, anteriorly barely recurved and not deepened. 2nd and 3rd striae near base indicated as rows of moderately fine punctures, reduced posteriorly. Outer striae almost invisible, at most 4th and 5th vaguely indicated near base. Only sutural stria well marked to apex. Only sutural interval and 2nd interval in basal half somewhat convex. 8th stria posteriorly deeply impressed, punctate, becoming weaker anteriorly, not attaining posterior marginal pore. Recurrent striole markedly oblique, meeting position of 3rd stria. Ridge laterally bordering recurrent striole markedly carinate. Anterior discal pore in anterior third, posterior pore slightly in front of posterior third. Microreticulation distinct, rather coarse, though slightly superficial, composed of moderately transverse meshes. Surface but moderately glossy. Wings slightly shortened. No perceptible variation noted.

Lower surface. Metepisternum barely longer than wide.

Genitalia. Male genital ring regularly triangular, narrow, slightly asymmetrical, apex rather wide. Aedeagus short and compact, lower surface straight, apex very short, widely rounded off.

Parameres moderately elongate, both 5-setose. Female genitalia unknown.

DISTRIBUTION

Known only from mountain top, Mt. Finnigan south of Cooktown, north Queensland.

HABITAT

Collected by pyrethrum knockdown and Berlese extraction of mossy tree trunks in montane rainforest above 1100m. Collected November and December.

ETYMOLOGY

Refers to the small size and narrow shape.

Philipis reticulata sp. nov.
(Figs 12F, 18B)

MATERIAL EXAMINED

HOLOTYPE: QMT13562; ♀, Bellenden Ker Range, NEQ, Cable Tower 3, 1054m, 17-24 Oct 1981, Earthwatch/Qld. Museum.

DIAGNOSIS

Small, convex, with s-shaped fascia in posterior half of elytra. Distinguished by well developed striae and presence of distinct microreticulation on elytra.

DESCRIPTION

Measurements. Length: 2.20mm; width: 1.02mm. Ratios: Width pronotum/head: 1.45; width/length of pronotum: 1.52; width base/apex of pronotum: 1.45; width widest diameter/base of pronotum: 1.07; length/width of elytra: 1.32.

Colour. Piceous, base and apex of elytra faintly lighter. Elytra with a well delimited, conspicuous, oblique, rather s-shaped, yellow fascia in posterior 2/5 medially slightly surpassing 2nd stria. Legs yellow.

Head. Frons medially of facial sulcus on either side with two distinct, rather deep, circular impressions. Facial sulci on clypeal suture with a conspicuous circular groove. Median antennomeres c. 1.2 x as long as wide. Microreticulation distinct on labrum and whole clypeus, more superficial, though still distinct on frons, reduced on vertex, about isodiametric to slightly transverse. Surface moderately glossy.

Pronotum. Transverse, convex, widest about in middle, base much wider than apex. Lateral margin posteriorly almost straight, even very faintly concave in front of posterior angles, slightly oblique. Posterior angles rectangular, feebly produced over lateral part of base. Carina at posterior angle elongate, markedly oblique, slightly incurved. Anterior transverse sulcus rather deep, barely interrupted. Posterior transverse sulcus very deep, interrupted by a large fovea. Anterior lateral seta situated well behind anterior third of margin. Microreticulation absent on disk, though still present on base and apex, surface glossy.

Elytra. Short, highly convex, egg-shaped, widest about in middle. Lateral border evenly curved, extremely finely serrate and pilose. Sutural stria crenulate. All other striae well impressed and coarsely punctate at least in basal half, visible right to apex. Almost all intervals convex, though lateral intervals less so than in middle. 8th stria deeply impressed throughout, strongly punctate-crenulate, attaining posterior marginal pore without becoming shallower. Recurrent striole rather oblique, meeting end of 3rd stria. Anterior discal pore in anterior third, posterior pore slightly in front of posterior third. Microreticulation distinct and conspicuous, composed of rather irregular, moderately transverse meshes. Surface rather dull. Wings almost fully developed. Variation unknown.

Lower surface. Metepisternum slightly longer than wide.

Genitalia. Male unknown. Female stylomere 2 with very stout dorsal ensiform seta situated rather basally.

DISTRIBUTION

Bellenden Ker Range, north Queensland. Known only from type locality.

HABITAT

Collected by pyrethrum knockdown on mossy tree trunks in montane rainforest at 1050m. Collected October.

ETYMOLOGY

Refers to the markedly microreticulate surface of elytra.

Philipis striata sp. nov.
(Figs 5B, 13A, 18B)

MATERIAL EXAMINED

HOLOTYPE: QMT13563; ♂, 1.5km W of Cape Tribulation (Site 3), NEQ, 7 Oct 1982, 150m, Monteith, Yeates & Thompson, Pyrethrum knockdown, RF.

PARATYPES: 3 ♀, same data (CBM, QM); 1 ♂, Mossman Bluff Track, 8km W Mossman, NEQ, 20 Dec 1989, 600m, GM & GT, Pyr. (Site 4) (QM).

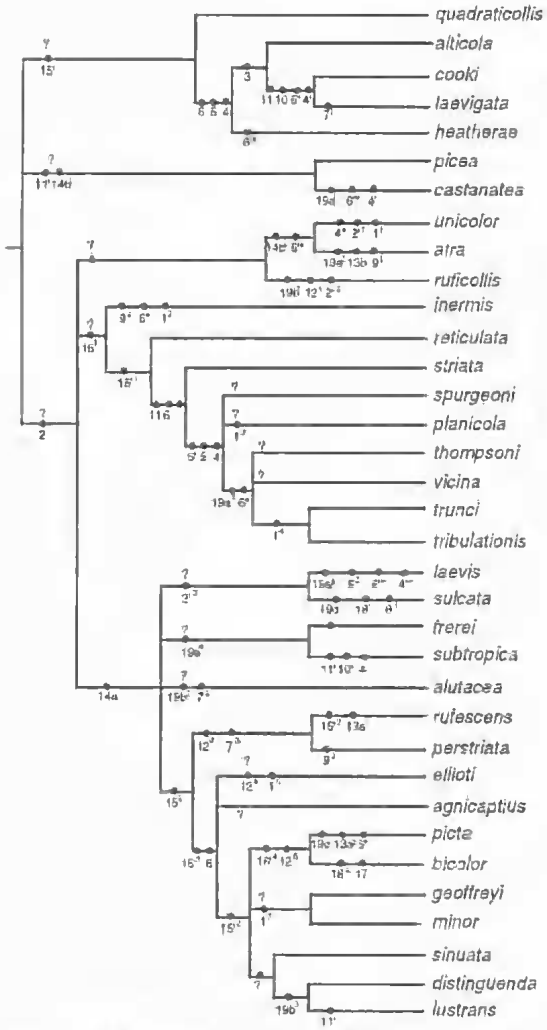

FIG. 9. Cladogram of the supposed relationships of the species of genus *Philipis*. Numbers of synapomorphies refer to Tables 1 and 2. Different apomorphic states distinguished by lower case letters. States of a morphocline indicated by: ', '', '''. Comparable or similar apomorphic states that are likely to have been convergently evolved marked by numbers: ^{1}, ^{2} etc.

DIAGNOSIS

Medium sized, convex, with s-shaped fascia in posterior half of elytra. Distinguished by well developed outer striae but depressed intervals, and by weak microreticulation of elytra.

DESCRIPTION

Measurements. Length: 2.15-2.45mm; width: 1.0-1.15mm. Ratios: Width pronotum/head: 1.50-1.53; width/length of pronotum: 1.56-1.58; width base/apex of pronotum: 1.50-1.54; width widest diameter/base of pronotum: 1.03-1.07; length/width of elytra: 1.32-1.34.

Colour. Dark piceous, pronotum, base to anterior third or half, and apex of elytra slightly lighter, posterior half of suture even lighter, reddish-piceous. Elytra with a well-defined, contrasting, oblique, s-shaped, dark yellow or light reddish fascia in posterior 2/5 medially reaching 2nd stria. Legs yellow.

Head. Median antennomeres c. 1.3 x as long as wide. Microreticulation distinct on labrum and anterior border of clypeus, superficial and rather difficult to see on frons, absent on vertex, about isodiametric. Surface fairly glossy.

Pronotum. Transverse, convex, widest about in middle, base much wider than apex. Lateral margin posteriorly almost straight, slightly oblique. Posterior angles rectangular, feebly produced over lateral part of base. Carina at posterior angle elongate, markedly oblique, slightly incurved. Anterior transverse sulcus rather deep, barely interrupted. Posterior transverse suleus very deep, interrupted by a large, deep fovea. Anterior lateral seta situated slightly behind anterior third of margin. Microreticulation completely absent, surface highly glossy.

Elytra. Short, highly convex, egg-shaped, widest about in middle. Lateral border evenly curved, extremely finely serrrate and pilose. Sutural stria crenulate. Other striae well developed as rows of coarse punctures, laterally and posteriorly not perceptibly finer. 2nd-5th striae in anterior half even slightly impressed. All striae well marked to apex. Sutural interval and basal part of 2nd and even 3rd intervals somewhat convex. 8th stria deeply impressed, punctate-crenulate, barely attaining posterior marginal pore. Recurrent striole rather evenly curved, mecting end of 3rd stria. Anterior discal pore in anterior third, posterior pore slightly in front of posterior third. Microreticulation on disk very superficial, though well visible when seen from laterally or posteriorly, composed of transverse meshes. Surface rather glossy. Wings slightly shortened.

Lower surface. Metepisternum slightly longer than wide.

Male genitalia. Genital ring regularly triangular, slightly asymmetrical, apex rather elongate. Aedeagus rather short and compact, lower surface feebly curved, apex perceptibly bent down short, widely rounded off. Parameres remarkably short, both 5-setose.

Female genitalia. Stylomere 2 with dorsal ensiform seta situated rather medially.

Variation. Apart from some differences of size and of shape of pronotum, little variation noted.

DISTRIBUTION

Lowlands at Cape Tribulation and foothills of Carbine Tableland west of Mossman, north Queensland.

HABITAT

Collected by pyrethrum knockdown on mossy tree trunks in rainforest of low and middle elevation below 600m. Collected October and December.

ETYMOLOGY

Refers to the complete striation of elytra.

Philipis planicola sp. nov.
(Figs 5C, 13B, 18C)

MATERIAL EXAMINED

HOLOTYPE: QMT13567; ♂, Bellenden Ker Range, NEQ Cableway Base Stn, 100m, 17 Oct-9 Nov 1981, Earthwatch/Qld. Museum, pyrethrum knockdown.

PARATYPES: 1 ♂, 1 ♀, Russell R. at Bellenden Ker Landing, NEQ, 5m, 1 Nov 1981, EW/QM, QM Berlesate No. 361, 17°16'S, 145°57'E, palm swamp, moss on tree trunks (CBM, QM).

DIAGNOSIS

Small, convex, with s-shaped fascia in posterior half of elytra. Distinguished species by wide base and straight lateral borders of pronotum.

DESCRIPTION

Measurements. Length: 2.1-2.2mm; width: 1.0-1.05mm. Ratios: Width pronotum/head: 1.48-1.49; width/length of pronotum: 1.50-1.54; width base/apex of pronotum: 1.54-1.55; width widest diameter/base of pronotum: 0.97-0.98; length/width of elytra: 1.30-1.31.

Colour. Head and and posterior 2/3 of elytra dark piceous, pronotum, anterior third of elytra, suture, and apex slightly lighter, piceous to reddish-piceous. Elytra with a well-defined, contrasting, oblique, s-shaped, dark yellow or light reddish fascia in posterior 2/5 medially reaching 2nd stria. Sometimes the median, slightly widened part of the fascia isolated. Legs yellowish.

Head. Median antennomeres c. 1.3 x as long as wide. Microreticulation absent except from labrum and anterior border of clypeus, there about isodiametric. Surface glossy.

Pronotum. Moderately transverse, markedly convex, widest immediately at base, base much wider than apex. Lateral margin strongly and evenly curved, posteriorly straight, not oblique. Posterior angles rectangular, feebly produced over lateral part of base. Carina at posterior angle elongate, oblique, slightly incurved, markedly raised. Anterior transverse sulcus deep, slightly interrupted by a fovea. Posterior transverse sulcus very deep, interrupted by a very large, deep fovea. Anterior lateral seta situated slightly behind anterior third of margin. Microreticulation completely absent, surface highly glossy.

Elytra. Short, highly convex, egg-shaped, widest about in middle. Lateral border evenly curved, extremely finely serrate and pilose. Sutural stria crenulate. Other striae well developed as rows of fairly coarse punctures, though laterally becoming finer. 2nd and 3rd striae in anterior half even faintly impressed. All striae traceable to apex. Sutural interval and basal part of 2nd interval somewhat convex. 8th stria deeply impressed throughout, punctate, surpassing posterior marginal pore. Recurrent striole rather evenly curved, meeting end of 3rd stria. Anterior discal pore in anterior third, posterior pore slightly in front of posterior third. Microreticulation completely absent, surface highly glossy. Wings slightly shortened. Little variation noted.

Lower surface. Metepisternum slightly longer than wide.

Male genitalia. Genital ring triangular, slightly asymmetrical, apex rather elongate. Aedeagus rather short and compact, lower surface feebly curved, apex short, widely rounded off. Internal sac near apex with a sclerotized piece either at bottom or at roof, according to the degree of eversion of internal sac. Left paramere with 5 setae, right paramere apparently 4-setose.

Female genitalia. Stylomere 2 with dorsal ensiform seta situated rather medially.

DISTRIBUTION

Lowland at eastern foot of Bellenden Ker Range, north Queensland.

HABITAT

A lowland species, found in "palm swamp" and lowland rainforest on mossy tree trunks by pyrethrum knockdown and Berlese extraction. Collected October-November.

ETYMOLOGY

Refers to the occurrence at low elevation only.

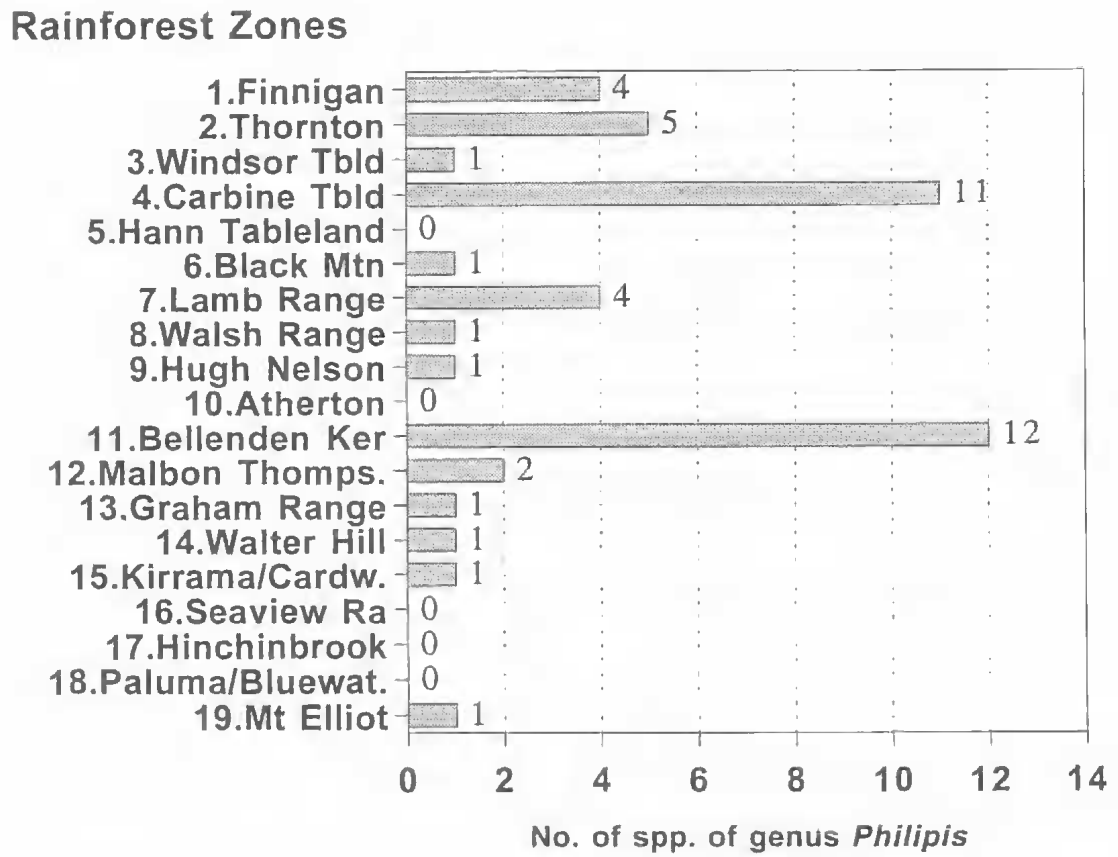

FIG. 10. Species numbers of genus *Philipis* in the north Queensland mountain/rainforest blocks. For explanation see text.

Philipis spurgeoni sp. nov.
(Figs 13C, 18C)

MATERIAL EXAMINED

HOLOTYPE: QMT13569; ♀, 16°24'S, 145°13'E, 3.5km NNE Mt. Spurgeon, NEQ, 16 Oct 1991, 1330m, Monteith & Janetzki, Pyrethrum, trees & rocks.

DIAGNOSIS

Medium sized, convex, with s-shaped fascia in posterior half of elytra. Distinguished by larger size, narrower base of elytra, and presence of microreticulation on elytra.

DESCRIPTION

Measurements. Length: 2.28mm; width: 1.08mm. Ratios: Width pronotum/head: 1.55; width/length of pronotum: 1.54; width base/apex of pronotum: 1.44; width widest diameter/base of pronotum: 1.07; length/width of elytra: 1.30.

Colour. Dark piceous, apex of elytra and posterior part of suture faintly lighter. Elytra with a fairly well delimited, moderately conspicuous, oblique, rather s-shaped, light reddish fascia in posterior 2/5 medially reaching 2nd stria. Legs light reddish.

Head. Median antennomeres c. 1.2 x as long as wide. Microreticulation distinct on labrum and anterior border of clypeus, posteriorly moderately superficial, about isodiametric. Surface glossy.

Pronotum. Transverse, convex, widest about in middle, base much wider than apex, lateral margin posteriorly almost straight, slightly oblique. Base slightly narrower than widest diameter. Posterior angles rectangular, feebly produced over lateral part of base. Carina at posterior angle elongate, rather oblique, slightly incurved. Anterior transverse sulcus rather deep, not interrupted. Posterior transverse sulcus very deep, interrupted by a fovea. Anterior lateral seta situated

well behind anterior third of margin. Microreticulation absent, surface highly glossy.

Elytra. Short, convex, egg-shaped, widest about in middle. Lateral border evenly curved, extremely finely serrate and pilose. Sutural stria crenulate. 2nd stria gently impressed, even 3rd-5th striae very faintly impressed in anterior half. Striae moderately punctate, 2nd slightly crenulate. Outer striae traceable in anterior half as rows of fine punctures. Inner four striae just visible at apex. Sutural interval convex throughout, 2nd interval in basal half faintly convex. 8th stria deeply impressed, punctate-crenulate, attaining posterior marginal pore. Recurrent striole rather oblique, meeting position of 3rd stria. Anterior discal pore in anterior third, posterior pore slightly in front of posterior third. Microreticulation distinct, though somewhat superficial, composed of slightly transverse meshes. Surface rather glossy, but markedly less glossy than prothorax. Wings slightly shortened. Variation unknown.

Lower surface. Metepisternum slightly longer than wide.

Genitalia. Male unknown. Female stylomere 2 with very stout dorsal ensiform seta situated rather basally.

DISTRIBUTION

Mt. Spurgeon area, Carbine Tableland, north Queensland. Known only from type locality.

HABITAT

Collected by pyrethrum knockdown on mossy tree trunks and rocks in montane rainforest above 1300m. Collected only October.

ETYMOLOGY

Refers to the type locality, Mt. Spurgeon.

Philipis trunci (Darlington)
(Figs 5D, 13D, 18C)

Tachys trunci Darlington, 1963: 31.
Philipis trunci, Erwin 1994: 568.

MATERIAL EXAMINED

HOLOTYPE: M.C.Z. Type No.30335; ♂, Mt. Alexandra, Thornton Peak Natl. Park, QLD, Dec.'197 (MCZ).
ADDITIONAL MATERIAL: 10 ♂, 6 ♀, Thornton Peak via Daintree, NEQ, 1000-1300m, 20-22 Sept 1981, GM & DC (ANIC, CBM, QM, USNM, ZSM); 1 ♂, Thornton Peak via Daintree, NEQ, 20-22 Sept 1981, GM & DC, QM Berlesate No. 301, RF, 1000-1300m, sieved litter & moss (QM); 2 ♂, 1 ♀, Thornton Peak, 11 km NE Daintree, NEQ, 1 Nov 1983, GM, DY & GT, QM Berlesate No. 605, 16°10S, 145°22E, RF, 1100m, moss on rocks & trees (QM).

DIAGNOSIS

Small, convex, with s-shaped fascia in posterior half of elytra. Distinguished by deeply impressed 1st and 2nd striae and by outer striae almost absent.

DESCRIPTION

Measurements. Length: 2.0-2.25mm; width: 0.95-1.03mm. Ratios: Width pronotum/head: 1.51-1.56; width/length of pronotum: 1.51-1.53; width base/apex of pronotum: 1.38-1.44; width widest diameter/base of pronotum: 1.09-1.13; length/width of elytra: 1.28-1.31.

Colour. Dark piceous, apex of elytra and posterior part of suture faintly lighter. Elytra with a rather ill delimited, inconspicuous, oblique, more or less s-shaped, light reddish fascia in posterior 2/5 medially reaching almost to 2nd stria. Legs reddish.

Head. Median antennomeres c. 1.3 x as long as wide. Microreticulation distinct on labrum and anterior border of clypeus, extremely superficial and very difficult to see on frons, absent on vertex, about isodiametric. Surface highly glossy.

Pronotum. Transverse, convex, widest about in middle, base much wider than apex. Lateral margin posteriorly almost straight, slightly oblique, even extremely faintly concave in front of posterior angles. Posterior angles rectangular, feebly produced over lateral part of base. Carina at posterior angle elongate, markedly oblique, slightly incurved. Anterior transverse sulcus rather deep, barely interrupted. Posterior transverse sulcus very deep, interrupted by a very large, deep fovea. Anterior lateral seta situated slightly behind anterior third of margin. Microreticulation absent, surface highly glossy.

Elytra. Short, highly convex, egg-shaped, widest about in middle. Lateral border evenly curved, extremely finely serrate and pilose. Sutural stria crenulate. 2nd stria beginning well behind base, punctate, almost as deeply impressed as sutural stria. 3rd-5th striae absent or indicated in anterior half only as extremely inconspicuous rows of very fine punctures, outer striae completely absent. Only sutural stria visible at apex. Sutural interval and basal half or 2/3 of 2nd interval convex. 8th stria deeply impressed, punctate-crenulate, barely attaining posterior marginal pore. Recurrent striole rather oblique, meeting end of 3rd stria. Anterior discal pore in anterior third, posterior pore slightly in front of posterior

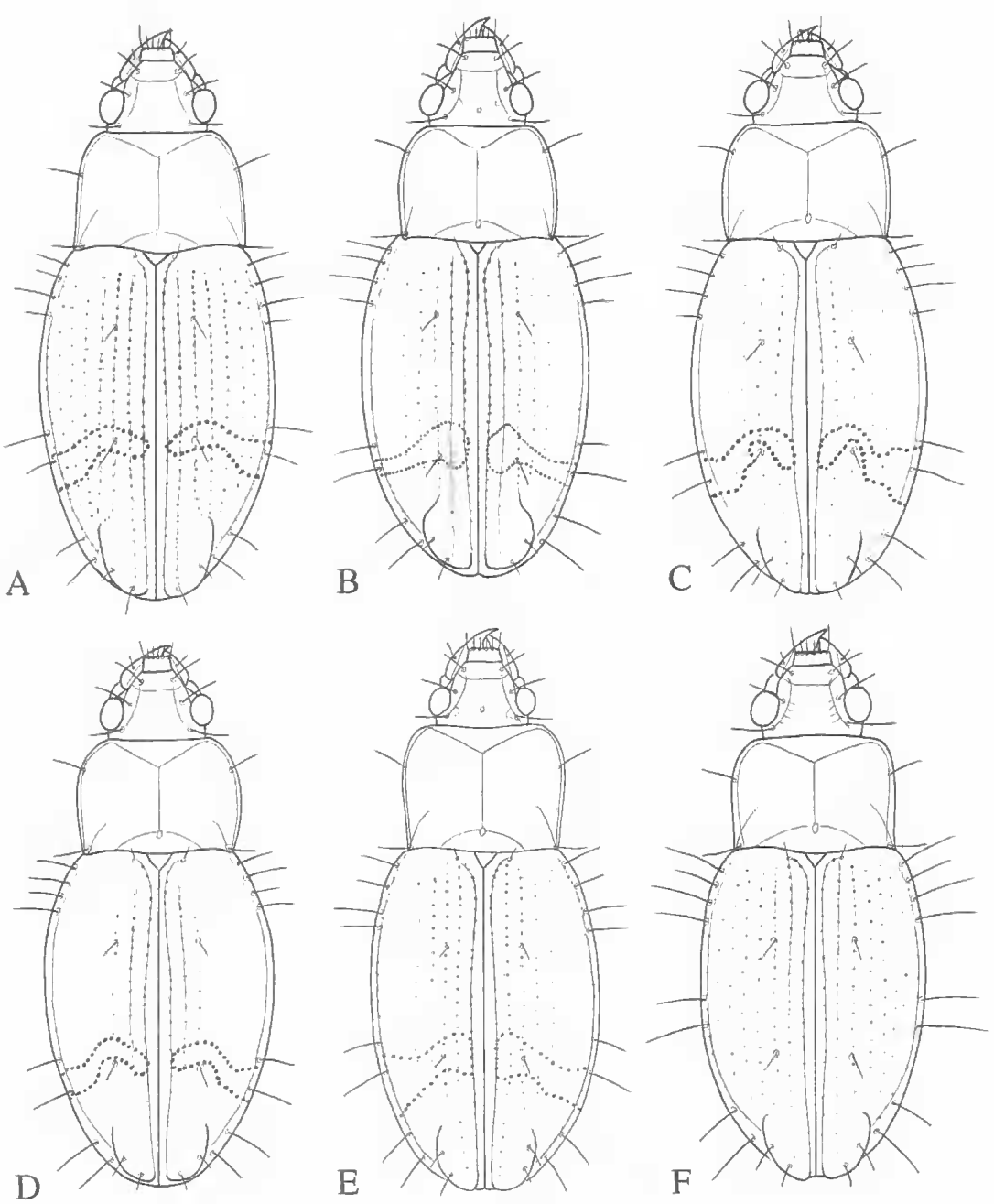

FIG. 11. Habitus. A, *Philipis quadraticollis* sp. nov. B, *P. alticola* sp. nov. C, *P. cooki* sp. nov. D, *P. laevigata* sp. nov. E, *Philipis heatherae* sp. nov. F, *P. picea* sp. nov. Lengths: 2.7mm; 2.75mm; 2.6mm; 2.2mm; 2.35mm; 2.5mm.

third. Microreticulation on disk extremely superficial, hardly visible, composed of transverse meshes; or absent. Surface highly glossy. Wings shortened.

Lower surface. Metepisternum slightly longer than wide.

Male genitalia. Genital ring triangular, narrow, rather asymmetric, apex narrow. Aedeagus moderately elongate, lower surface straight or faintly bisinuate in basal 2/3, in apical third slightly curved down, apex moderately elongate, widely rounded off. Internal sac near apex with moderately distinct trianglar fold. Parameres rather elongate, both 5-setose.

Female genitalia. Stylomere 2 with very stout dorsal ensiform seta situated rather basally.

Variation. Generally little variation noted, apart from some differences in distinctness of the elytral fascia which is in one specimen even almost invisible. One specimen, however, differs in following respects; base of pronotum narrower than usual (ratio width base/apex 1.38 compared with 1.43-1.44 as usual); 2nd stria far less impressed than usual; oblique fascia on elytra more contrasting than usual.

DISTRIBUTION

Thornton Peak north of Daintree, north Queensland. Known only from this monuntain top.

HABITAT

Collected by pyrethrum knockdown and Berlese extraction of mossy tree trunks and rocks in montane rainforest above 1000m. The unique type was collected "on the trunk of a small tree in rainforest at probably about 3,000 ft. altitude". Collected September, November, and December.

Philipis tribulationis sp. nov.
(Figs 5E, 13E, 18C)

MATERIAL EXAMINED

HOLOTYPE: QMT13570; ♂, 4.0km W of Cape Tribulation (Site 8), NEQ, 28 Sept 1982, 720m, Monteith, Yeates & Thompson, Pyrethrum knockdown, RF.

PARATYPES: 2 ♂, 3.5km W of Cape Tribulation (Site 7), NEQ, 2 Oct 1982, 680m, GM, DY & GT, Pyr., RF (QM); 1 ♂, 1 ♀, 4.5-5.0km W. of Cape Tribulation (Top Camp), NEQ, 1-6 Oct 1982, 760-780m, GM, DY & GT, Pyr., RF (CBM, QM); 1 ♀, 16°04'S, 145°24'E, Mt Pieter Botte, NEQ, 950m, 21 Nov 1993, GM & HJ, Pyr./trees, logs, rocks (QM); 4 ♂, 16°03'S, 145°25'E, Mt Halcyon, NEQ, 870m, 23 Nov 1993, GM & HJ, Pyr./trees & logs (ANIC, CBM, QM); 1 ♀, Windsor Tableland, NEQ, 9 Jan 1989, 1225m, ES & ANZSES Site 3, Pyr. (QM).

DIAGNOSIS

Small, convex, with s-shaped fascia on posterior half of elytra. Distinguished by 2nd stria less impressed than 1st, smaller size, and rather narrow base of pronotum.

DESCRIPTION

Measurements. Length: 1.95-2.14mm; width: 0.92-0.98mm. Ratios: Width pronotum/head: 1.48-1.54; width/length of pronotum: 1.50-1.53; width base/apex of pronotum: 1.40-1.42; width widest diameter/base of pronotum: 1.08-1.11; length/width of elytra: 1.31-1.33.

Colour. Dark piceous, pronotum, basal third and apex of elytra slightly lighter, posterior half of suture even lighter, reddish-piceous. Elytra with a well-defined, contrasting, oblique, s-shaped, dark yellow or light reddish fascia in posterior 2/5 medially reaching 2nd stria. Legs yellow.

Head. Frons anteriorly somewhat uneven. Median antennomeres c. 1.3 x as long as wide. Microreticulation distinct on labrum and anterior border of clypeus, very superficial and difficult to see on frons, absent on vertex, about isodiametric. Surface glossy.

Pronotum. Rather transverse, convex, widest about in middle, base much wider than apex. Lateral margin evenly curved, though posteriorly less so than towards apex. Posterior angles rectangular or even slightly acute, feebly produced over lateral part of base. Carina at posterior angle elongate, oblique, slightly incurved. Anterior transverse sulcus rather deep, slightly interrupted by a fovea. Posterior transverse sulcus very deep, interrupted by a large, deep fovea. Anterior Lateral seta situated slightly behind anterior third of margin. Microreticulation absent, surface highly glossy.

Elytra. Short, highly convex, egg-shaped, widest about in middle. Lateral border evenly curved, extremely finely serrrate and pilose. Sutural stria crenulate. Other striae well developed as rows of fairly coarse punctures, though becoming finer laterally and posteriorly. 2nd and 3rd striae in anterior half even faintly impressed. At least inner striae traceable to apex. Sutural interval and basal part of 2nd interval somewhat convex. 8th stria deeply impressed, punctate-crenulate, barely attaining posterior marginal pore. Recurrent striole rather evenly curved, meeting end of 3rd stria. Anterior discal pore in anterior third, posterior pore slightly in front of posterior third. Microreticulation transverse, on disk strongly reduced and extremely superficial, even under high

magnification amost invisible, slightly better seen near apex. Surface rather glossy. Wings shortened.

Lower surface. Metepisternum barely longer than wide.

Male genitalia. Genital ring triangular, rather asymmetric, especially at base, apex rather elongate. Aedeagus moderately elongate, lower surface basally straight, feebly curved to apex, apex fairly short, widely rounded off. Both parameres 5-setose.

Female genitalia. Stylomere 2 with dorsal ensiform seta situated rather medially.

Variation. Apart from some differences of size and relative width of pronotum, very little variation noted.

DISTRIBUTION

Mountains some kilometers west of Cape Tribulation to Windsor Tableland, north Queensland.

HABITAT

Collected by pyrethrum knockdown on mossy tree trunks in montane rainforest between 680 and 1200m. Collected September-October and January.

ETYMOLOGY

Refers to the type locality, the vicinity of Cape Tribulation.

Philipis thompsoni sp. nov.
(Figs 2, 5F, 13F, 17B)

MATERIAL EXAMINED

HOLOTYPE: QMT13578; ♂, Hugh Nelson Ra., 2.5km S. of Crater N.P., NQ, 5 Dec 1988, 1100m, Monteith & Thompson, pyrethrum/logs & trees.

PARATYPES: 3 ♂, 2 ♀, 1 (?sex), same data (CBM, QM); 1 ♂, 1 ♀, Mt. Fisher, 7km SW Millaa Millaa, NQ (Whiteing Rd), 5 May 1983, 1200m, GM, DY, RF, Pyr. (QM); 2 ♂, Mt. Edith, Lamb Range, NEQ, 12 Oct 1982, 1000-1100m, GM, DY & GT, Pyr., RF (QM); 1 ♀, Emerald Ck, Lamb Range, NEQ, 11 Oct 1982, 950m, GM, DY & GT, Pyr., RF (CBM); 1 ♂, 1 ♀, 21km S Atherton, NEQ, 1040-1100m, 5 Nov 1983, DY & GT, Pyr., RF (CBM, QM); 1 ♀, Baldy Mtn Rd, 7 km SW Atherton, NEQ, 9 Dec 1988, 1150m, GM & GT, Pyr./logs & trees (QM); 1 ♂, 1 ♀, Mt. Father Clancy, 9 km S Millaa Millaa, NEQ, 6 Dec 1988, 1000m, GM & GT, Pyr./logs & trees (QM); 3 ♂, Mt. Formartine South, 10km N Kuranda, NEQ, 23 Nov 1990, 700m, GM & GT, Pyr./trees & logs (QM); 1 ♂, 1 ♀, 16°55'S, 145°40'E, Mt. Williams, NEQ, 900-1000m, 2-3 Dec 1993, DC, GM & HJ (QM); 1 ♂, 1 ♀, 17°03'S, 145°42'E, Isley Hills, NEQ, 1050m, 30 Nov 1993, GM & HJ, Pyr./trees & logs (QM); 1 ♂, 17°16'S, 145°49'E, Massey Range, 4km W of Centre Bellenden Ker, NEQ, 9-11 Oct 1991, 1250m, GM, HJ & DC (QM); 1 ♂, Mt. Bartle Frere, NEQ, West Side, 1050m, 8 Dec 1990, GM, GT & RS, Pyr./trees & rocks (QM); 1 ♀, 1 (sex?), Upper Boulder Ck. via Tully, NEQ, 900m, 26 Oct 1983, GM, DY & GT, Pyr., RF (QM); 6 ♂, 3 ♀, Upper Boulder Creek. 11km N Tully, NEQ, 5 Dec 1989, 1000m, GM, GT, HJ, Pyr./logs & trees (ANIC, CBM, QM, USNM, ZSM); 2 ♂, 1 ♀, Tully Falls, NEQ, 8 Dec 1990, 750m, GM, GT, HJ, Pyr., logs & trees (CBM, QM); 2 ♀, Cardwell Range, NEQ, Mt Macalister area, 1000m, 19 Dec 1986, GM, GT & SH, Pyr. (QM).

DIAGNOSIS

Medium sized, convex, with s-shaped fascia in posterior half of elytra. Distinguished by larger size, wide base of elytra, absence of microreticulation on elytra and shorter aedeagus with almost straight lower surface.

DESCRIPTION

Measurements. Length: 2.15-2.30mm; width: 1.0-1.1mm. Ratios: Width pronotum/head: 1.51-1.55; width/length of pronotum: 1.46-1.52; width base/apex of pronotum: 1.45-1.49; width widest diameter/base of pronotum: 1.08-1.11; length/width of elytra: 1.33-1.34.

Colour. Dark piceous, apex of elytra and posterior part of suture, commonly also base of elytra faintly lighter. Elytra with a fairly well delimited, moderately conspicuous, oblique, more or less s-shaped, light reddish fascia in posterior 2/5 medially reaching 2nd stria. Legs reddish.

Head. Median antennomeres c. 1.3 x as long as wide. Microreticulation distinct on labrum and anterior border of clypeus, highly superficial, but discernible at high magnification on frons, absent on vertex, about isodiametric. Surface glossy.

Pronotum. Transverse, convex, widest about in middle, base much wider than apex. Lateral margin evenly curved, though posteriorly sometimes almost straight, slightly oblique. Posterior angles rectangular, feebly produced over lateral part of base. Carina at posterior angle elongate, markedly oblique, slightly incurved. Anterior transverse sulcus rather deep, not interrupted. Posterior transverse sulcus very deep, barely interrupted. Anterior lateral seta situated well behind anterior third of margin. Microreticulation absent, surface highly glossy.

Elytra. Short, highly convex, egg-shaped, widest about in middle. Lateral margin evenly curved, extremely finely serrate and pilose. Sutural stria crenulate. 2nd stria well visible as a row of fairly distinct punctures, sometimes even faintly impressed in anterior half. Outer striae traceable at least in anterior half as fine rows of

punctures. Only sutural stria visible at apex. Sutural interval convex, sometimes also 2nd interval in basal half faintly convex. 8th stria deeply impressed, punctate-crenulate, clearly attaining posterior marginal pore. Recurrent striole rather oblique, meeting end of 3rd stria. Anterior discal pore in anterior third, posterior pore slightly in front of posterior third. In males microreticulation on disk extremely superficial and hardly visible, or absent, in most females microreticulation slightly more distinct, composed of transverse meshes. Surface in males highly glossy, in females usually slightly less glossy. Wings slightly shortened.

Lower surface. Metepisternum slightly longer than wide.

Male genitalia. Genital ring triangular, narrow, rather asymmetric, apex narrow. Aedeagus moderately elongate, lower surface straight in basal 2/3, in apical third feebly curved down, apex moderately elongate, widely rounded off. Internal sac near apex with very distinct triangular fold. Parameres rather short, both 5-setose.

Female genitalia. Stylomere 2 with very stout dorsal ensiform seta situated rather basally.

Variation. Due to the wide range of this species, some variation of colour, distinctness of pattern, shape of pronotum, and degree of microreticulation and striation of elytra noted.

DISTRIBUTION

A widely distributed species from the Kuranda area, the Lamb Range, mountains surrounding the Atherton Tableland, and south to the Cardwell Range, north Queensland.

HABITAT

Collected by pyrethrum knockdown on mossy tree trunks and logs in montane rainforest above 700m. Collected October-December and May.

ETYMOLOGY

Named in honour of Geoff Thompson, collector of many specimens of *Philipis*.

Philipis vicina sp. nov.
(Figs 6A, 14A, 17B)

MATERIAL EXAMINED

HOLOTYPE: QMT13612; ♂, Mt. Misery Summit via Helenvale, NEQ, 6 Dec 1990, 850m, Monteith, Sheridan & Roberts, Pyrethrum-trees & logs.

DIAGNOSIS

Medium sized, convex, with s-shaped fascia in posterior half of elytra. Distinguished by larger size, narrower base of elytra, absence of microreticulation on elytra, and longer aedeagus with bisinuate lower surface.

DESCRIPTION

Measurements. Length: 2.20mm; width: 1.00mm. Ratios: Width pronotum/head: 1.52; width/length of pronotum: 1.55; width base/apex of pronotum: 1.40; width widest diameter/base of pronotum: 1.10; length/width of elytra: 1.33.

Colour. Dark piceous, apex of elytra and posterior part of suture faintly lighter. Elytra with a fairly well delimited, moderately conspicuous, oblique, s-shaped, light reddish fascia in posterior 2/5 medially reaching 2nd stria. Legs light reddish.

Head. Median antennomeres c. 1.2 x as long as wide. Microreticulation distinct on labrum and anterior border of clypeus, posteriorly superficial, about isodiametric. Surface glossy.

Pronotum. Transverse, convex, widest about in middle, base much wider than apex. Lateral margin posteriorly almost straight, slightly oblique. Base little narrower than widest diameter. Posterior angles rectangular, feebly produced over lateral part of base. Carina at posterior angles elongate, rather oblique, slightly incurved. Anterior transverse sulcus rather deep, not interrupted. Posterior transverse sulcus very deep, interrupted by a fovea. Anterior lateral seta situated well behind anterior third of margin. Microreticulation absent, surface highly glossy.

Elytra. Short, convex, egg-shaped, widest about in middle. Lateral border evenly curved, extremely finely serrate and pilose. Sutural stria crenulate. 2nd stria faintly impressed in anterior half. 3rd-5th striae well visible as rows of moderately fine punctures, outer striae traceable in anterior half as rows of fine punctures. Inner four striae just visible at apex. Sutural interval convex throughout, 2nd interval in basal half faintly convex. 8th stria deeply impressed, punctate-crenulate, attaining posterior marginal pore. Recurrent striole elongate, rather oblique, meeting position of 3rd stria. Anterior discal pore in anterior third, posterior pore slightly in front of posterior third. Microreticulation almost absent. Surface highly glossy. Wings slightly shortened. Variation unknown.

Lower surface. Metepisternum slightly longer than wide.

Genitalia. Male genital ring triangular, narrow, rather asymmetric, apex narrow. Aedeagus fairly elongate, lower surface perceptibly bisnuate in basal 2/3, in apical third feebly curved down,

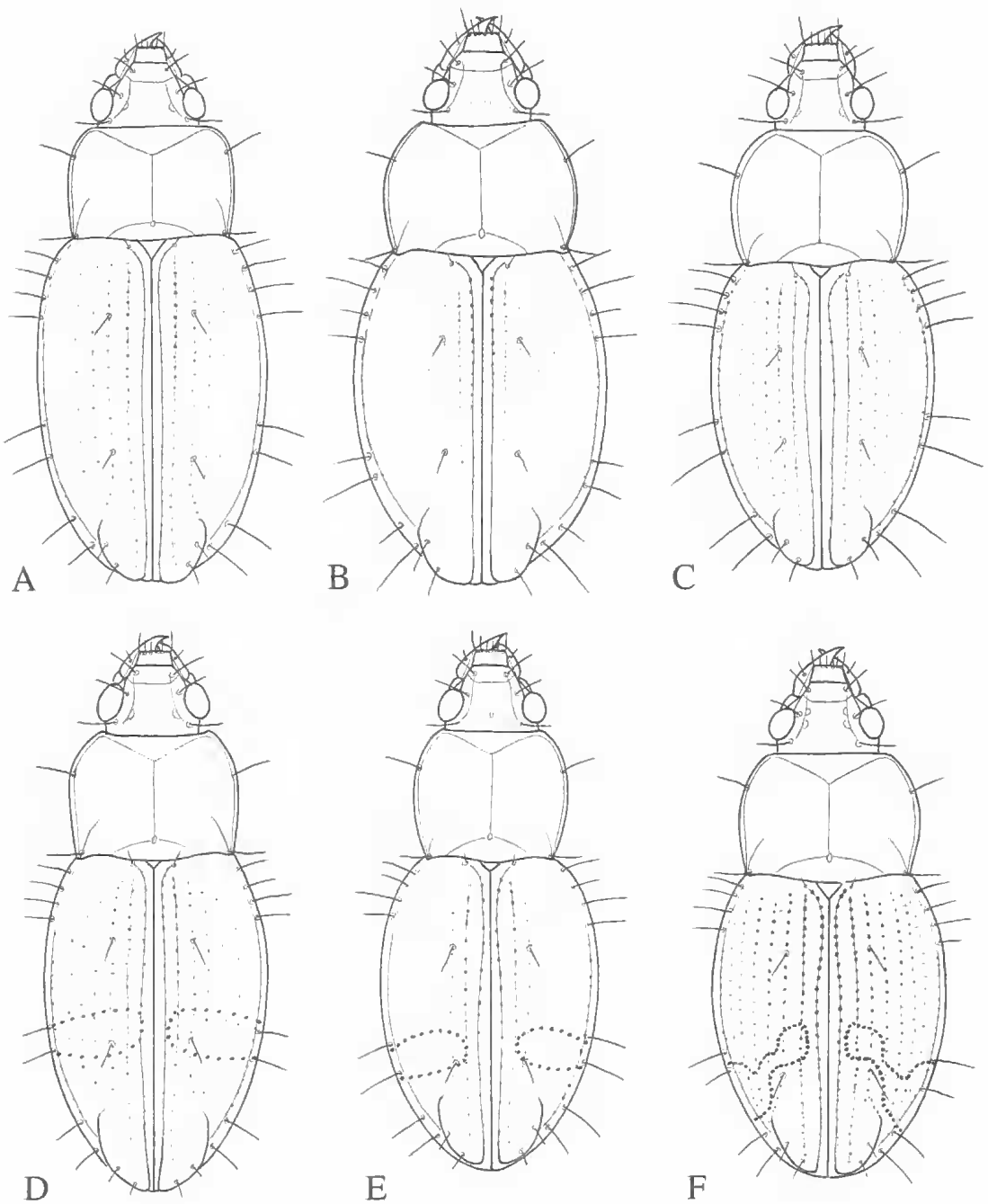

FIG. 12. Habitus. A, *P. castanea* sp. nov. B, *P. unicolor* sp. nov. C, *Philipis atra* sp. nov. D, *P. ruficollis* sp. nov. E, *P. inermis* sp. nov. F, *P. reticulata* sp. nov. Lengths: 2.35mm; 2.05mm; 2.45mm; 2.5mm; 1.95mm; 2.2mm.

apex rather elongate, widely rounded off. Internal sac near apex with very distinct triangular fold. Parameres rather elongate, both 5-setose. Female genitalia unknown.

DISTRIBUTION

Mt. Misery south of Helenvale, north Queensland. Known only from type locality.

HABITAT

Collected by pyrethrum knockdown on mossy tree trunks and logs in montane rainforest above 850m. Collected December only.

ETYMOLOGY

Refers to the very close relationships of this species with *P. thompsoni* and *P. spurgeoni*.

Philipis laevis sp. nov.
(Figs 6B, 14B, 17B)

MATERIAL EXAMINED

HOLOTYPE: QMT13613; ♂, Thornton Peak via Daintree, NEQ, 1000-1300m, 20-22 Sept 1981, G. Monteith & D. Cook.

PARATYPES: 2 ♀, same data (QM); 7 ♂, 6 ♀, Thornton Peak summit, via Daintree, NEQ, 24-27 Sept 1984, GM & SM, QM Berlesate NO. 662, RF, 1100-1300m, sieved litter & moss (ANIC, CBM, QM, USNM, ZSM).

DIAGNOSIS

Small, short, convex, easily identified by quadrimaculate pattern, absence of all elytral striae apart from 1st, and highly glossy surface.

DESCRIPTION

Measurements. Length: 2.05-2.30mm; width: 1.04-1.12mm. Ratios: Width pronotum/head: 1.58-1.62; width/length of pronotum: 1.43-1.49; width base/apex of pronotum: 1.41-1.45; width widest diameter/base of pronotum: 1.12-1.15; length/width of elytra: 1.24-1.28.

Colour. Head and pronotum dark piceous, elytra slightly lighter, piceous or reddish-piceous. Elytra with two rather ill-defined spots, a larger, about triangular one at outer angle of shoulder, and a smaller, narrower, fascia-like one behind middle, extending from border to position of 3rd stria. Legs reddish to reddish-brown, apex of femora and tibiae, and tarsi yellow.

Head. Median antennomeres c. 1.75 x as long as wide. Microreticulation well visible only on labrum and anterior half of clypeus, extremely superficial and hardly recognizable on anterior part of frons, absent on rest of head, about isodiametric. Surface highly glossy.

Pronotum. Rather convex, transverse, widest about in middle, base much wider than apex. Lateral margin strongly and evenly curved, though more to apex than to base. Posterior angles rectangular, distinctly produced over lateral part of base. Carina at posterior angle comparatively short, oblique, slightly incurved. Anterior transverse sulcus deep, uninterrupted. Posterior transverse sulcus very deep, interrupted by a large fovea. Anterior lateral seta situated slightly behind anterior third of margin. Microreticulation absent, surface highly glossy.

Elytra. Short and wide, highly convex, widest in middle, lateral border evenly curved. Sutural stria in anterior half slightly punctulate, posteriorly smooth, Other striae absent, but sometimes 2nd stria in basal half faintly indicated as a row of delicate punctures. Only sutural interval convex. 8th stria deeply impressed, barely punctate, not attaining posterior marginal pore. Recurrent striole rather short, close to lateral border and markedly oblique, anteriorly suddenly incurved, hardly meeting position of 3rd stria. Anterior discal pore in anterior third, posterior pore slightly behind posterior 2/5. Microreticulation absent, surface highly glossy. Wings extremely shortened.

Lower surface. Metepisternum about as long as wide.

Male genitalia. Genital ring slightly asymmetrical, apex rather acute. Aedeagus short and compact, lower surface to apex slightly curved. Apex short, rounded off. Both parameres 5-setose.

Female genitalia. Stylomere 2 with very stout dorsal ensiform seta situated about medially.

Variation. Apart from some minor differences in size, relative shape of pronotum, and degree of 2nd stria of elytra, little variation noted.

DISTRIBUTION

Thornton Peak north of Daintree, north Queensland. Known only from this mountain top.

HABITAT

Collected in montane rainforest above 1000m by Berlese extraction from litter and moss. Collected September.

ETYMOLOGY

Refers to the remarkably smooth and glossy surface of elytra.

Philipis sulcata sp. nov.
(Figs 6C, 14C, 18D)

MATERIAL EXAMINED

HOLOTYPE: QMT13624; ♂, nr. Plane Crash Site, 11km NW Mossman, NEQ, 28 Dec 1989, 1240m, ANZSES, Pyrethrum.

PARATYPES: 2 ♂, 1 ♀, same data (CBM, QM); 2 ♀, Pauls Luck, Platypus Ck, 13km W Mossman, NEQ, 1-2 Jan 1990, 1100m, ANZSES, Pyr. (QM); 2 ♂, 1 ♀, Mossman Bluff Summit 10km W Mossman, NEQ, 18 Dec 1988, 1300m, GM & GT, Pyr. trees & rocks (QM, USNM); 1 ♂, Mossman Bluff Track 6km W Mossman, NEQ, 16 Dec 1988, 480m, GM & GT, Pyr. trees & rocks (QM); 5 ♀, Devil's Thumb 12km NW Mossmann, NEQ, 27 Dec 1989, 1000m, ANZSES, Pyr. (ANIC, CBM, QM, ZSM).

DIAGNOSIS

Small to medium sized, highly convex, easily identified by the fully and deeply striate elytra, the elongate, on lower surface near apex strongly sinuate aedeagus with elongate apex, and the elongate, parallel parameres; further distinguished from *P. perstriata* sp. nov. by wider elytra, absence of microreticulation on the elytra, and shorter apical elytral spot.

DESCRIPTION

Measurements. Length: 2.05-2.5mm; width: 0.95-1.2mm. Ratios: Width pronotum/head: 1.58-1.64; width/length of pronotum: 1.53-1.57; width base/apex of pronotum: 1.48-1.57; width widest diameter/base of pronotum: 1.11-1.15; length/width of elytra: 1.27-1.31.

Colour. Dark piceous, pronotum and posterior half of suture slightly lighter, in light specimens pronotum even dark reddish. Behind shoulder and in posterior 2/5 of elytra with a rather inconspicuous, slightly transverse, yellowish spot each, both attaining about 4th stria. Both spots moderately conspicuous and not well delimited. Pores on 3rd stria encircled by a small yellowish spot. Legs dark yellow.

Head. Very short and wide, neck very wide, separated from frons by a shallow impression. Median antennomeres barely longer than wide. Microreticulation distinct on whole surface, even on vertex, though somewhat superficial, about isodiametric to slightly transverse. Surface rather dull.

Pronotum. Transverse, convex, widest about in middle or slightly in front of it, base much wider than apex. Lateral margin posteriorly but feebly convex, fairly oblique. Posterior angles rectangular, barely produced over lateral part of base. Carina at posterior angle very elongate, markedly oblique, slightly incurved. Anterior transverse sulcus deep, not interrupted. Median line rather deeply impressed. Posterior transverse sulcus very deep, interrupted by a rather large fovea. Anterior lateral seta situated well behind anterior third of margin, Microreticulation very superficial or almost absent, surface glossy.

Elytra. Very short and convex, egg-shaped, widest about in middle. Lateral border evenly curved, not perceptibly serrate and pilose. All striae deeply impressed, sulcate, and crenulate till apex. All intervals markedly convex along their whole course. 8th stria deeply impressed, anteriorly barely shallower, crenulate, attaining posterior marginal pore. Recurrent striole elongate, markedly oblique, anteriorly suddenly incurved, meeting 3rd stria. Anterior discal pore well behind anterior third, posterior pore very close to anterior pore, shortly behind middle. Both pores very large, foveiform, interrupting 3rd interval. Microreticulation highly superficial to almost absent, moderately transverse. Surface rather glossy. Wings extremely shortened.

Lower surface. Metepisternum c. 1.2 x as long as wide.

Male genitalia. Genital ring triangular, rather asymmetric, moderately wide, apex narrow. Aedeagus fairly elongate, lower surface conspicuously bisinuate near apex, apex elongate, far protruding, curved, fairly wide and widely rounded off. Parameres elongate, right narrow, both with 5 unusually short setae of which only the most apical seta is rather elongate, at or near apex.

Female genitalia. Stylomere 2 with stout dorsal ensiform seta situated rather medially.

Variation. Apart from some minor differences in colour, relative shape of pronotum, and degree of microreticulation on pronotum and elytra, little variation noted. However, there is one perhaps not fully coloured and somewhat deformed specimen that shows more distinct aberrations in shape and microsculpture: it has a remarkably rough surface of the elytral intervals, and strongly crenulate striae. However, this may be due to some creasing of the elytra shortly after emerging.

DISTRIBUTION

Mountains of the Carbine Tableland west of Mossman, north Queensland.

HABITAT

Collected by pyrethrum knockdown on mossy trees and rocks in montane rainforest, usually

above 1100m, but one record just below 500m. Collected December and January.

ETYMOLOGY

Refers to the deeply sulcate elytral striation.

Philipis frerei sp. nov.
(Figs 6D, 14D, 18D)

MATERIAL EXAMINED

HOLOTYPE: QMT13634; ♂, Mt. Bartle Frere, NEQ, 0.5km N of Sth. Peak, 6-8 Nov 1981, 1500m, Earthwatch/Qld. Museum pyrethrum knockdown.

PARATYPES: 1 ♂, 6 ♀, Mt. Bartle Frere, NEQ, Sth. Peak Summit, 1620m, 6-8 Nov 1981, EW/QM Pyr. (ANIC, CBM, QM, ZSM); 1 ♀, Mt. Bartle Frere, summit creek, NEQ, 24 Sept 1981, GM & DC, QM Berlesate No. 304, RF, 1500m, sieved litter (QM); 1 ♂, 1 ♀, Mt. Bartle Frere, NEQ, Central Ridge, 1500m, 27 Dec 1989, GM, Pyr., logs (CBM, QM).

DIAGNOSIS

Medium sized, quadrimaculate, with reddish pronotum and transverse apical elytral spot, distinguished from similarly patterned species by almost fully striate elytra, very weak microreticulation on the elytra, small aedeagus with elongate apex, and 4-setose parameres.

DESCRIPTION

Measurements. Length: 2.05-2.45mm; width: 1.0-1.15mm. Ratios: Width pronotum/head: 1.60-1.64; width/length of pronotum: 1.44-1.51; width base/apex of pronotum: 1.42-1.48; width widest diameter/base of pronotum: 1.11-1.19; length/width of elytra: 1.31-1.34.

Colour. Reddish-piceous, pronotum, apex and suture of elytra faintly lighter. Elytra at shoulder with a very inconspicuous, extremely ill delimited, about triangular, light reddish spot attaining about position of 4th stria. In posterior 2/5 of elytra with a moderately conspicuous, fairly well delimited, narrowly triangular, slightly oblique, light reddish spot or stripe, attaining about 3rd stria. Legs light reddish, tibiae sometimes faintly darker.

Head. Frons without median groove. Median antennomeres c. 1.2 x as long as wide. Microreticulation distinct and coarse on most of head, weaker only on vertex, about isodiametric to slightly transverse. Surface somewhat dull.

Pronotum. Transverse, moderately convex, widest about in middle, base much wider than apex. Lateral margin posteriorly moderately curved, rather oblique, at posterior angles faintly incurved. Base usually distinctly narrower than widest part. Posterior angles fairly obtuse, slightly produced over lateral part of base. Carina at posterior angle moderately elongate, rather oblique, slightly incurved. Anterior transverse sulcus fairly deep, feebly interrupted. Posterior transverse sulcus deep, interrupted by large fovea. Anterior lateral seta situated slightly behind anterior third of margin. Microreticulation distinct, though superficial, almost isodiametric, surface moderately glossy.

Elytra. Rather short and convex, egg-shaped, widest slightly behind anterior third. Lateral border evenly curved, extremely finely, almost not perceptibly, serrate and pilose. 1st-3rd striae deeply impressed, punctate-crenulate. All other striae at least in basal half perceptibly impressed, though becoming shallower laterally and apically. All striae moderately finely punctate. 1st-4th intervals convex throughout, outer intervals convex only in basal half, becoming posteriorly rather depressed. All striae well visible at apex, though outer striae finer. 8th stria deeply impressed throughout, indistinctly punctate, attaining posterior marginal pore. Recurrent striole elongate, rather oblique, meeting 3rd stria. Anterior discal pore well behind anterior third, posterior pore well in front of posterior third. Microreticulation indistinct and highly superficial, consisting of irregular, rather transverse meshes. Surface glossy. Wings extremely shortened.

Lower surface. Metepisternum about as long as wide.

Male genitalia. Genital ring almost regularly triangular, wide, feebly asymmetric, apex rather narrow. Aedeagus very small, short and compact, lower surface in apical half strongly curved down, apex moderately short, widely rounded off. Parameres moderately elongate, both 4-setose.

Female genitalia. Stylomere 2 with stout dorsal ensiform seta situated rather medially.

Variation. Apart from some differences in relative shape of pronotum, little variation noted.

DISTRIBUTION

Mt. Bartle Frere, north Queensland. Known only from that mountain top.

HABITAT

Collected by pyrethrum knockdown on mossy tree trunks and logs, and by Berlese extraction of litter in montane rainforest above 1500m. Collected September, November, and December.

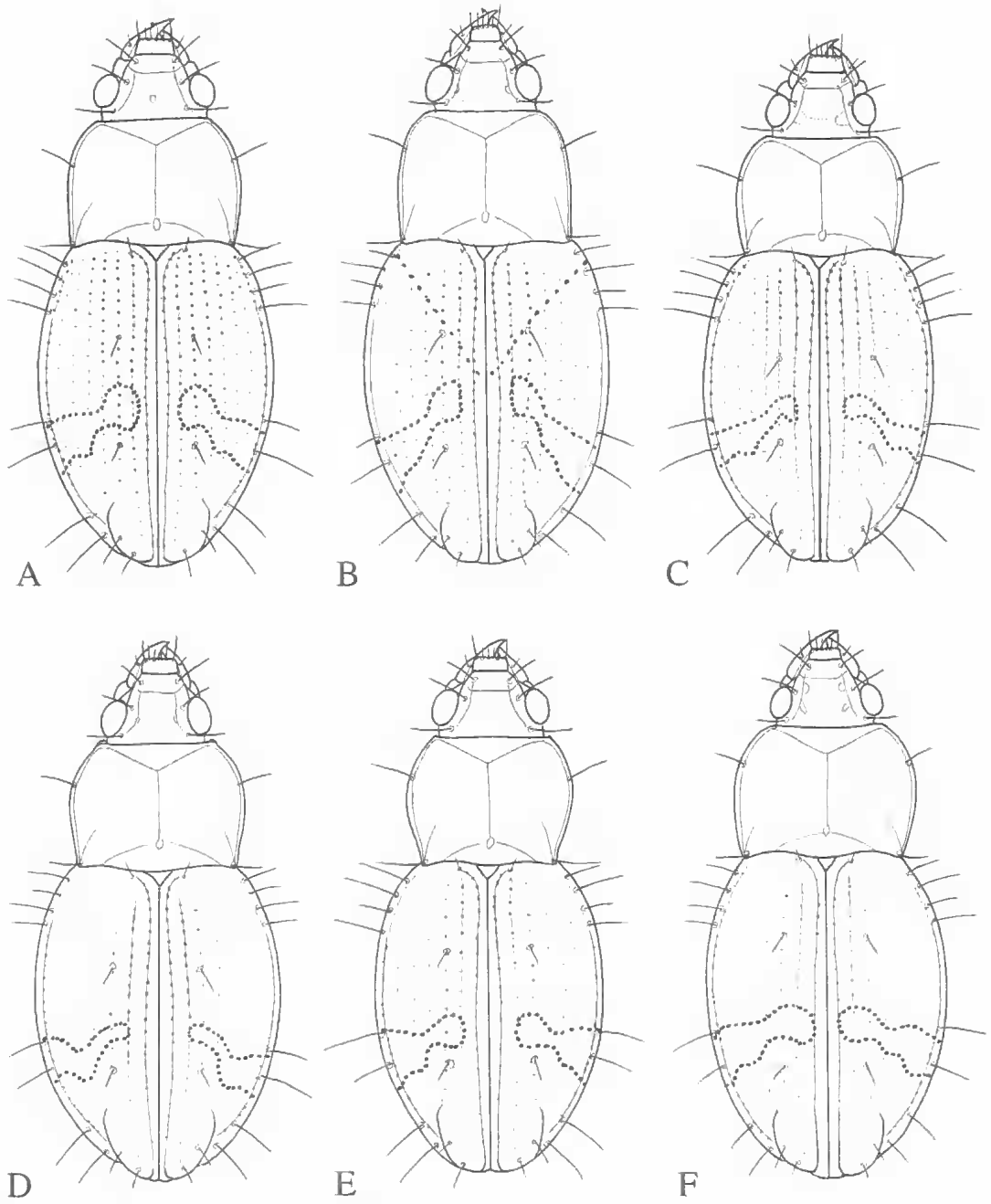

FIG. 13. Habitus. A, *Philipis striata* sp. nov. B, *P. planicola* sp. nov. C, *P. spurgeoni* sp. nov. D, *P. trunci* (Darlington). A, *Philipis tribulationis* sp. nov. B, *P. thompsoni* sp. nov. Lengths: 2.3mm; 2.1mm; 2.3mm; 2.1mm; 2.0mm; 2.25mm.

ETYMOLOGY

Refers to the type locality, Mt. Bartle Frere.

Philipis subtropica sp. nov.
(Figs 6E, 14E, 17A)

MATERIAL EXAMINED

HOLOTYPE: ♂, 28°14'S, 153°08'E Lamington N.P. (O'Reillys) Q, 22-27 Oct 1978, Lawrence & Weir, under bark rotten logs (ANIC).

PARATYPES: 1 ♀, same data (ANIC); 1 ♂, 28°16'S, 153°10'E Mt. Bithongabel, 1400m, Lamington Nat. Pk., Q, 23 Oct 1978, JL & TW, ANIC Berlesate 654, moss & litter *Nothofagus moorei* (CBM); 3 ♂, 3 ♀, 28°15'S, 153°16'E, Springbrook Repeater, 1000m, 16 Apr 1995, GM, Pyr. tree trunks (CBM, QM).

DIAGNOSIS

Medium-sized to large, quadrimaculate, with dark pronotum and transverse apical elytral spot, distinguished from similarly patterned species by absence of microreticulation on the elytra, presence of only 3 elytral striae, on lower surface evenly curved aedeagus with elongate, rather compact apex, and 5-setose parameres.

DESCRIPTION

Measurements. Length: 2.3-2.8mm; width: 1.0-1.25mm. Ratios: Width pronotum/head: 1.54-1.64; width/length of pronotum: 1.42-1.47; width base/apex of pronotum: 1.43-1.47; width widest diameter/base of pronotum: 1.13-1.15; length/width of elytra: 1.35-1.36.

Colour. Reddish-piceous, head slightly darker, apex of elytra and sometimes suture faintly lighter. Elytra at shoulder with an inconspicuous, ill delimited, about triangular, light reddish spot attaining about position of 5th stria. In posterior 2/5 of elytra with an equally ill delimited, transverse, yellowish spot, attaining about 2nd stria. Legs dark yellow to slightly infuscate.

Head. Median antennomeres c. 1.3 x as long as wide. Microreticulation distinct on labrum and anterior part of clypeus, superficial on frons and vertex, about isodiametric to slightly transverse. Surface fairly glossy.

Pronotum. Rather transverse, fairly convex, widest slightly in front of middle, base much wider than apex. Lateral margin posteriorly almost straight, fairly oblique. Posterior angles rectangular, feebly produced over lateral part of base. Carina at posterior angle fairly elongate, moderately oblique, slightly incurved. Anterior transverse sulcus rather shallow, more or less distinctly interrupted. Posterior transverse sulcus fairly deep, becoming shallow in middle, though without fovea. Anterior lateral seta situated well behind anterior third of margin. Microreticulation absent, surface highly glossy.

Elytra. Moderately short and convex, egg-shaped, widest slightly behind anterior third. Lateral border evenly curved, not perceptibly serrate and pilose. Sutural stria crenulate, 2nd stria in basal half just perceptible as a row of extremely fine and superficial punctures, outer striae absent. 1st interval convex, sometimes 2nd interval faintly convex near base. Only sutural stria traceable to apex. 8th stria deeply impressed, anteriorly shallower, punctate, though anteriorly smooth, just attaining posterior marginal pore, or interrupted shortly in front of it. Recurrent striole elongate, moderately oblique, meeting position of 3rd stria. Anterior discal pore well behind anterior third, posterior pore slightly in front of posterior third. Microreticulation absent. Surface highly glossy. Wings extremely shortened.

Lower surface. Metepisternum c. 1.2 x as long as wide.

Male genitalia. Genital ring very asymmetric, not triangular, wide, apex wide. Aedeagus rather large, fairly short and compact, lower surface concave, apex rather elongate, wide, protruding, widely rounded off. Internal sac within folded sclerite with a conspicuous, strongly sclerotized peg directed anteroventrally. Parameres moderately elongate, both 5-setose.

Female genitalia. Stylomere 2 with stout dorsal ensiform seta situated rather medially.

Variation. Some apparent sexual variation noted, since the few females tend to be markedly larger than the males. Also some variation in relative shape of the pronotum. Length of male genital ring and of aedeagus varies also to some degree.

DISTRIBUTION

Lamington Plateau and the adjacent Springbrook Plateau, southeast Queensland.

HABITAT

Collected in montane, temperate rainforest above 1000m under bark of rotten logs, by Berlese extraction from moss and litter of *Nothofagus*, and by pyrethrum knockdown on mossy tree trunks. Collected April and October.

ETYMOLOGY

Refers to the occurrence in subtropical latitude in south Queensland.

Philipis alutacea sp. nov.
(Figs 6F, 14F, 18D)

MATERIAL EXAMINED

HOLOTYPE: QMT13641; ♂, Bellenden Ker, NEQ, summit, 10 June 1980, G. B. Monteith.

PARATYPES: 1 ♀, same data (QM); 1 ♂, 2 ♀, Bellenden Ker Range, NEQ, Summit TV Stn., 1560m, 17 Oct-5 Nov 1981, EW/QM Pyr. (ANIC, CBM, QM); 1 ♂, Bellenden Ker Range, NEQ, Summit TV Stn., 1560m, 1-7 Nov 1981, EW/QM, QM Berlesate No. 346, 17°16'S, 145°51'E, RF, moss on trees & rocks (QM); 1 ♂, Bellenden Ker, NEQ, Centre Peak Summit, 10 Apr 1979, GM, QM Berlesate No. 10, 17°16'S, 145°51'E, RF, 1500m, moss on trees (CBM).

DIAGNOSIS

Medium-sized, quadrimaculate, with dark pronotum and transverse apical elytral elytral spot, distinguished from similarly patterned species by distinct microreticulation on the elytra, fully, but very weakly striate elytra, on lower surface bisinuate aedeagus with very wide apex, and 5-setose parameres.

DESCRIPTION

Measurements. Length: 2.25-2.45mm; width: 1.05-1.12mm. Ratios: Width pronotum/head: 1.64-1.68; width/length of pronotum: 1.46-1.49; width base/apex of pronotum: 1.63-1.67; width widest diameter/base of pronotum: 1.04-1.06; length/width of elytra: 1.32-1.35.

Colour. Reddish-piceous, head and that part of elytra between the spots and just behind apical spot slightly darker. Elytra at some distance behind shoulder with an inconspicuous, ill delimited, about triangular, light reddish spot attaining about position of 4th stria. In posterior 2/5 of elytra with a rather conspicuous, fairly well delimited, straight, oblique, light reddish spot or stripe, surrounded by dark colour, attaining about 3rd stria. Both spots usually well removed from lateral border. Legs light reddish, tibiae slightly darker.

Head. Median antennomeres c. 1.6 x as long as wide. Microreticulation distinct on most of head, weaker only on vertex, about isodiametric to slightly transverse. Surface somewhat dull.

Pronotum. Transverse, moderately convex, widest in or slightly behind of middle, base much wider than apex. Lateral margin posteriorly little curved, but feebly oblique, at posterior angles faintly incurved. Hence base but slightly narrower than widest part. Posterior angles fairly obtuse, distinctly produced over lateral part of base. Carina at posterior angle moderately elongate, rather oblique, slightly incurved. Anterior transverse sulcus fairly deep, not interrupted. Posterior transverse sulcus fairly deep, in middle shallower, but without conspicuous fovea. Anterior lateral seta situated well behind anterior third of margin. Microreticulation very distinct, almost isodiametric, surface rather dull.

Elytra. Rather short and convex, egg-shaped, widest slightly in front of middle. Lateral border evenly curved, extremely finely, almost not perceptibly, serrate and pilose. Sutural stria crenulate. 2nd stria in basal half slightly impressed, 3rd-5th striae near base very faintly impressed, outer striae very inconspicuous. All striae finely punctate, puncturation becoming even finer laterally and apically. Sutural interval convex throughout, 2nd interval slightly convex in basal half, outer intervals depressed. Only 1st and 2nd striae well visible at apex, outer striae barely perceptible. 8th stria deeply impressed throughout, punctate, attaining posterior marginal pore. Recurrent striole elongate, rather oblique, meeting position of 3rd stria. Anterior discal pore well behind anterior third, posterior pore well in front of posterior third. Microreticulation distinct, consisting of but feebly transverse meshes. Surface rather dull. Wings slightly shorter than elytra.

Lower surface. Metepisternum feebly longer than wide.

Male genitalia. Genital ring regularly triangular, wide, apex rather narrow. Aedeagus rather large, moderately compact, lower surface gently bisinuate, apex short and very wide, widely rounded off. Parameres large, elongate, both 5-setose.

Female genitalia. Stylomere 2 with stout dorsal ensiform seta situated rather medially.

Variation. Some variation noted in relative shape of pronotum and elytra and in degree of microreticulation.

DISTRIBUTION

Mt. Bellenden Ker, north Queensland. Known only from that mountain top.

HABITAT

Collected by pyrethrum knockdown on mossy trunks and rocks in montane rainforest above 1500m. Collected April, June, October, and November.

ETYMOLOGY

Refers to the remarkably dull surface.

Philipis rufescens sp. nov.
(Figs 7A, 15A, 18D)

MATERIAL EXAMINED

HOLOTYPE: QMT13645; ♂, Bellenden Ker Range, NEQ, Summit TV Stn., 1560m, 17 Oct-5 Nov 1981, Earthwatch/Qld. Museum pyrethrum knockdown.

PARATYPES: 9 ♂, 7 ♀, same data (ANIC, CBM, QM, USNM, ZSM); 7 ♂, 1 ♀, Bellenden Ker, Centre Peak Summit, NEQ, 10 Apr 1979, GM, QM Berlesate No. 8, 17°16'S, 145°51'E, RF, 1500m, moss on trees (CBM, QM); 1 ♂, Bellenden Ker summit, NEQ, 10 June 1980, GM (QM); 19 ♂, 14 ♀, Bellenden-Ker Range, NEQ, Summit TV Stn., 1560m, 28 Oct 1983, GM, DY & GT, Pyr. in RF (ANIC, CBM, QM, USNM); 1 ♂, 4 ♀, Bellenden Ker Range, NEQ, Summit TV Stn., 1560m, 1-7 Nov 1981, EW/QM, QM Berlesate NO. 337, 340, 341, 343, 344, 17°16'S, 145°51'E, RF, sieved litter, stick brushings, stick & moss brushings, moss on trees & rocks (QM); 1 ♂, Mt. Bellenden Ker, Centre Peak Summit, NEQ, 10-12 Apr 1979, 1500m, GM (QM); 9 ♂, 4 ♀, 17°16'S, 145°52E, Bellenden Ker summit, NEQ, 8 Oct 1991, 1560m, GM & HJ, Pyr., trees & logs (CBM, QM, ZSM).

DIAGNOSIS

Medium-sized, reddish-piceous, quadrimaculate, with red pronotum and oblique, slightly sinuate apical elytral spot, further distinguished by fully and deeply striate elytra, distinct microreticulation of elytra, evenly curved lower surface of aedeagus with short, convex apex, and 4-setose parameres.

DESCRIPTION

Measurements. Length: 2.15-2.45mm; width: 1.02-1.10mm. Ratios: Width pronotum/head: 1.56-1.63; width/length of pronotum: 1.36-1.45; width base/apex of pronotum: 1.38-1.41; width widest diameter/base of pronotum: 1.12-1.18; length/width of elytra: 1.37-1.38.

Colour. Head and dark parts of elytra reddish-piceous to piceous, pronotum, base and apex of elytra and suture more or less dark reddish. Elytra at shoulder with a medially rather ill delimited, about triangular, light reddish spot attaining about position of 4th stria. In posterior 2/5 of elytra with a rather conspicuous, fairly well delimited, oblique, though but slightly s-shaped, light reddish stripe, attaining about 2nd stria. Legs yellow to light reddish, barely infuscate.

Head. Median antennomeres c. 1.4 x as long as wide. Microreticulation distinct on most of head, weaker only on vertex, about isodiametric to slightly transverse. Surface somewhat dull.

Pronotum. Transverse, moderately convex, widest in front of middle, base much wider than apex. Lateral margin posteriorly little curved, though rather oblique, at posterior angles perceptibly incurved. Posterior angles remarkably obtuse, distinctly produced over lateral part of base. Carina at posterior angle with elongate, little oblique, slightly incurved. Anterior transverse sulcus rather shallow, faintly interrupted in middle or at least becoming shallower. Posterior transverse sulcus fairly deep, interrupted by a rather large fovea. Anterior lateral seta situated well behind anterior third of margin. Microreticulation distinct, almost isodiametric, surfacesomewwhatdull.

Elytra. Moderately short and convex, egg-shaped, widest slightly in front of middle. Lateral border evenly curved, extremely finely, almost not perceptibly, serrate and pilose. 1st and 2nd striae deeply impressed, crenulate. 3rd-5th striae in anterior half slightly impressed, outer striae faintly or barely impressed, though all striae easily visible as rows of rather fine punctures, that become finer laterally and apically. 1st and 2nd intervals convex throughout, 3rd-5th intervals near base more or less distinctly convex. Inner five striae just visible near apex. 8th stria deeply impressed throughout, punctate, attaining posterior marginal pore. Recurrent striole elongate, rather oblique, meeting 3rd stria. Anterior discal pore well behind anterior third, posterior pore in front of posterior third. Microreticulation distinct, though somewhat superficial, consisting of rather irregular, moderately transverse meshes. Surface moderately glossy. Wings markedly shortened.

Lower surface. Metepisternum about as long as wide.

Male genitalia. Genital ring regularly triangular, moderately wide, apex rather narrow. Aedeagus small, short and compact, lower surface concave, apex very short, widely rounded off. Parameres moderately elongate, both 4-setose.

Female genitalia. Stylomere 2 with stout dorsal ensiform seta situated rather medially.

Variation. Apart from some allometric variation of relative width and shape of pronotum, which in large specimens tends to be relatively wider, little variation noted.

DISTRIBUTION

Mt. Bellenden Ker, north Queensland. Known only from this mountain top.

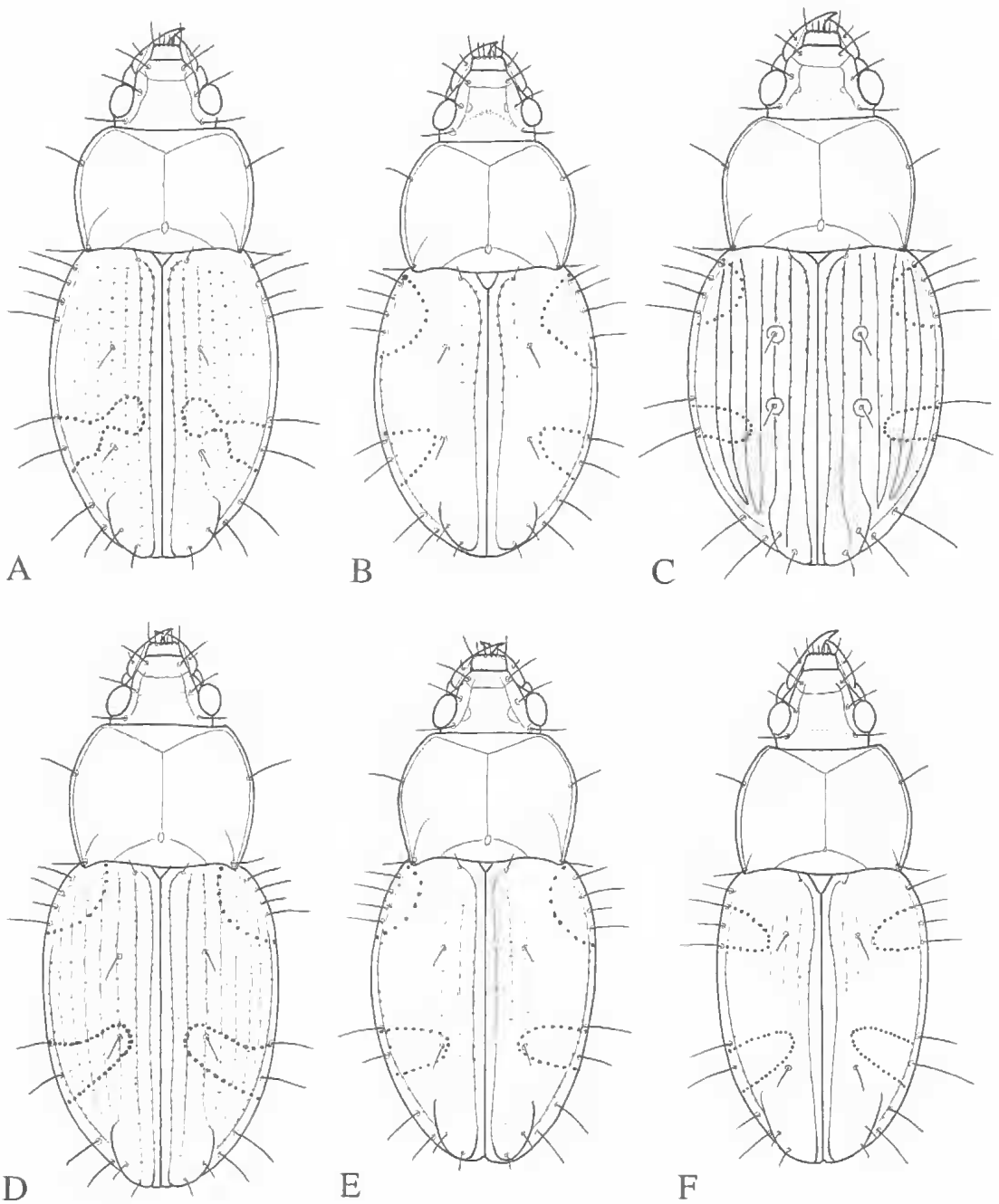

FIG. 14. Habitus. A, *P. vicina* sp. nov. B, *P. laevis* sp. nov. C, *Philipis sulcata* sp. nov. D, *P. frerei* sp. nov. E, *P. subtropica* sp. nov. F, *P. alutacea* sp. nov. Lengths: 2.2mm; 2.25mm; 2.4mm; 2.3mm; 2.75mm; 2.25mm.

HABITAT

Collected by pyrethrum knockdown on mossy trees and logs and by Berlese extraction of litter, moss, and sticks in montane rainforest above 1500m. Collected April, June, October, and November.

ETYMOLOGY

Refers to the generally reddish colour of this species.

Philipis perstriata sp. nov.
(Figs 15B, 19A)

MATERIAL EXAMINED

HOLOTYPE: QMT 13726; ♀, Mt.Bartle Frere, NEQ, Sth. Peak Summit, 1620m, 6-8 Nov 1981, Earthwatch/Qld. Museum, pyrethrum knockdown.

DIAGNOSIS

Small, reddish-piceous, quadrimaculate, with reddish pronotum and oblique, slightly sinuate apical elytral spot, distinguished from *P. rufescens* sp. nov. by smaller size, narrower shape, sulcate elytral striae, and weak microreticulation of elytra.

DESCRIPTION

Measurements. Length: 2.05mm; width: 0.9mm. Ratios: Width pronotum/head: 1.64; width/length of pronotum: 1.41; width base/apex of pronotum: 1.37; width widest diameter/base of pronotum: 1.17; length/width of elytra: 1.39.

Colour. Reddish-piceous, pronotum, base, apex, suture, and lateral borders of elytra slightly lighter, reddish. Elytra behind shoulder with a large, though very inconspicuous, ill delimited, about triangular, light reddish spot attaining about 4th stria. In posterior 2/5 of elytra with an inconspicuous, very ill delimited, slightly oblique, narrow, light reddish fascia attaining about 2nd stria. Legs light reddish.

Head. Median antennomeres c. 1.2 x as long as wide. Microreticulation very distinct, coarse, only in posterior half somewhat superficial, about isodiametric to slightly transverse. Surface rather dull.

Pronotum. Transverse, moderately convex, widest slightly in front of middle, base much wider than apex. Lateral margin posteriorly almost straight, though rather oblique. Base distinctly narrower than widest part. Posterior angles almost rectangular, slightly obtuse, slightly produced over lateral part of base. Carina in posterior angle moderately elongate, little oblique, slightly incurved. Anterior transverse sulcus fairly shallow, slightly interrupted. Posterior transverse sulcus rather deep, interrupted by a large fovea. Anterior lateral seta situated well behind anterior third of margin. Microreticulation very distinct and coarse, slightly transverse, laterally even forming short, transverse wrinkles, surface markedly dull.

Elytra. Moderately short and convex, egg-shaped, widest about in middle. Lateral border evenly curved, not perceptibly serrate and pilose. Surface in posterior 2/5 just behind posterior fascia with large, transverse impression. All striae deeply impressed throughout, all intervals markedly convex. Puncturation of striae very fine, barely visible. 8th stria deeply impressed throughout, finely punctate, surpassing posterior marginal pore. Recurrent striole elongate, markedly oblique, anteriorly suddenly incurved, meeting 3rd stria. Anterior discal pore slightly behind anterior third, posterior pore well in front of posterior third. All marginal setae rather short. Microreticulation highly superficial, difficult to see, consisting of irregular, transverse meshes. Surface highly glossy. Wings markedly shortened. Variation unknown.

Lower surface. Metepisternum about as long as wide.

Genitalia. Male unknown. Female stylomere 2 with stout dorsal ensiform seta situated rather medially.

DISTRIBUTION

Mt. Bartle Frere, north Queensland. Known only from this mountain top.

HABITAT

Collected by pyrethrum knockdown on mossy tree trunks in montane rainforest above 1600m. Collected November.

ETYMOLOGY

Refers to the completely and deeply striate elytra.

Philipis ellioti sp. nov.
(Figs 7B, 15C, 17B)

MATERIAL EXAMINED

HOLOTYPE: QMT13727; ♂, 19°30'S, 146°57'E, Mt. Elliot summit, NEQ, 1150m, 12 May 1991, D. Cook, pyrethrum, tree & logs.

PARATYPES: 6 ♂, 4 ♀, same data (ANIC, CBM, QM, USNM, ZSM); 1 ♂, 1 ♀, 19°29'S, 14657'E, Mt. Elliot, NEQ, North Ck., 27 Mar 1991, 1000m, GM, Pyr., trees & logs (QM); 1 ♂, Mt. Elliot Summit, 30km SW

Townsville, NEQ, 13 Dec 1990, AG, Hand Collecting (QM).

DIAGNOSIS

Small, piceous, quadrimaculate, with ill delimited basal, and oblique, only slightly sinuate apical elytral spot, further distinguished by lack of microreticulation, rather elongate aedeagus with evenly curved lower surface, and commonly 4-setose right paramere.

DESCRIPTION

Measurements. Length: 2.0-2.15mm; width: 0.9-1.0mm. Ratios: Width pronotum/head: 1.50-1.53; width/length of pronotum: 1.38-1.46; width base/apex of pronotum: 1.28-1.43; width widest diameter/base of pronotum: 1.12-1.16; length/width of elytra: 1.35-1.41.

Colour. Head and dark parts of elytra piceous, pronotum, base, lateral border, and suture of elytra lighter, reddish. Behind shoulder with an inconspicuous, medially very ill delimited, circular, light reddish spot, attaining about 3rd stria, but difficult to tell from dark reddish base. In posterior 2/5 of elytra with a fairly conspicuous, rather well delimited, transverse, yellowish spot, attaining about 2nd stria. Legs dark yellow to light piceous.

Head. Median antennomeres barely longer than wide. Microreticulation distinct on labrum and anterior part of clypeus, superficial on frons, reduced on vertex, about isodiametric to slightly transverse. Surface moderately glossy.

Pronotum. Moderately transverse, fairly convex, widest about in middle or slightly in front of it, base much wider than apex. Lateral margin posteriorly but feebly convex or even straight, fairly oblique. Posterior angles rectangular, not produced over lateral part of base. Carina at posterior angle moderately elongate, fairly oblique, slightly incurved. Anterior transverse sulcus exceptionally shallow, not interrupted. Posterior transverse sulcus deep, interrupted by a rather large fovea. Anterior lateral seta situated behind anterior third of margin. Microreticulation very superficial or almost absent, surface glossy.

Elytra. Moderately short and convex, egg-shaped, widest slightly behind anterior third. Lateral border evenly curved, not perceptibly serrate and pilose. Sutural and 2nd striae deeply impressed, crenulate. 3rd-5th striae still visible as rows of rather coarse punctures at least in anterior half. Outer striae hardly perceptible. 1st and 2nd intervals convex, sometimes even 3rd interval slightly convex near base. Only 1st-3rd striae traceable to apex. 8th stria deeply impressed, anteriorly slightly shallower, finely punctate, though anteriorly smooth, attaining posterior marginal pore. Recurrent striole elongate, moderately oblique, meeting 3rd stria. Anterior discal pore well behind anterior third, posterior pore slightly in front of posterior third. Microreticulation absent. Surface highly glossy. Wings shortened.

Lower surface. Metepisternum c. 1.2 x as long as wide.

Male genitalia. Genital ring triangular, feebly asymmetric, rather wide, apex narrow. Aedeagus rather small, moderately elongate, lower surface concave, apex short, fairly wide, widely rounded off. Parameres moderately elongate, right 5-setose, left 4- or 5-setose.

Female genitalia. Stylomere 2 with stout dorsal ensiform seta situated rather medially.

Variation. Little variation noted, apart from minor differences in shape of pronotum, shape of posterior elytral fascia, and number of setae on left male paramere.

DISTRIBUTION

Mt. Elliot south of Townsville, north Queensland. Known only from that mountain top.

HABITAT

Collected by pyrethrum knockdown on mossy trees and logs in montane rainforest above 1000m, only one specimen by "hand collecting". Collected March, May, and December.

ETYMOLOGY

Refers to the type locality, Mt. Elliot.

Philipis agnicapitis sp. nov.
(Figs 7C, 15D, 19A)

MATERIAL EXAMINED

HOLOTYPE: QMT13736; ♂, Lambs Head, 10km W Edmonton, NEQ, 10 Dec 1989, 1200m, Monteith, Thompson, Janetzki, pyrethrum, logs & trees.

PARATYPES: 1 ♂, 1 ♀, same data (CBM); 1 ♂, 2 ♀, Lambs Head, 10km W Edmonton, NEQ, 1200m, 11 Dec 1989 (2nd Tower), GM, GT, HJ, Pyr., logs & trees (QM, ZSM); 1 ♂, 1 (sex?), Lambs Head, 10km W Edmonton, NEQ, 4 Dec 1988, 1200m, GM & GT, Pyr./logs & trees (QM); 3 ♂, 2 ♀, 17°02'S, 145°40'E, Lambs Head, NEQ, (East End), 29 Nov 1993, 1180m, GM & HJ Pyr./trees & logs (ANIC, CBM, QM, USNM).

DIAGNOSIS

Small, reddish-piceous, quadrimaculate, with ill delimited basal, and only slightly oblique, barely sinuate apical elytral spot, further distinguished by lack of microreticulation, narrow pronotum, moderately elongate aedeagus with evenly curved lower surface, and 5-setose right paramere.

DESCRIPTION

Measurements. Length: 1.85-2.30mm; width: 0.85-1.05mm. Ratios: Width pronotum/head: 1.50-1.57; width/length of pronotum: 1.39-1.42; width base/apex of pronotum: 1.34-1.37; width widest diameter/base of pronotum: 1.13-1.15; length/width of elytra: 1.34-1.39.

Colour. Reddish-piceous to piceous, pronotum, apex and suture, sometimes also base of elytra faintly lighter. Elytra at shoulder with an inconspicuous, ill delimited, about triangular, light reddish spot attaining about position of 4th stria. In posterior 2/5 of elytra with a slightly more conspicuous, moderately well delimited, transverse, light reddish spot or stripe, attaining about 3rd or even 2nd stria. Legs yellowish to light reddish, tibiae sometimes faintly darker.

Head. Median antennomeres c. 1.2 x as long as wide. Microreticulation distinct, though fairly superficial on most of head, almost absent only on vertex, about isodiametric to slightly transverse. Surface moderately glossy.

Pronotum. Moderately transverse and convex, widest slightly in front of middle, base much wider than apex. Lateral margin posteriorly little or almost straight, though rather oblique. Base usually distinctly narrower than widest part. Posterior angles almost rectangular, barely obtuse, only feebly produced over lateral part of base. Carina at posterior angle moderately elongate, slightly oblique, slightly incurved. Anterior transverse sulcus fairly deep, feebly interrupted. Posterior transverse sulcus deep, interrupted by large fovea. Microreticulation very superficial, apparently slightly transverse, surface glossy.

Elytra. Rather short and convex, egg-shaped, widest slightly in front of middle. Lateral border evenly curved, extremely finely, almost not perceptibly, serrate and pilose. 1st and 2nd striae moderately impressed, rather finely punctate. 3rd-5th striae more or less distinctly impressed in basal half, outer striae very fine, barely perceptible. Puncturation generally rather fine. 1st and 2nd intervals gently convex throughout, outer intervals almost depressed, even in basal half. Only four inner striae visible at apex. 8th stria deeply impressed throughout, distinctly punctate, attaining posterior marginal pore. Recurrent striole elongate, rather oblique, meeting 3rd stria. Anterior discal pore well behind anterior third, posterior pore in front of posterior third. Microreticulation extremely superficial, perceptible only laterally and near apex, consisting of irregular, transverse meshes. Surface glossy. Wings shortened.

Lower surface. Metepisternum about as long as wide.

Male genitalia. Genital ring almost regularly triangular, moderately wide wide, feebly asymmetric, apex rather narrow. Aedeagus rather short and compact, lower surface fairly concave, apex narrow, short, rounded off. Upper border sinuate near apex. Parameres rather short, both 5-setose.

Female genitalia. Stylomere 2 with stout dorsal ensiform seta situated rather medially.

Variation. Apart from minor differences in shape of pronotum and distinctness of elytral pattern, little variation noted.

DISTRIBUTION

Lambs Head west of Edmonton, north Queensland. Known only from that mountain top.

HABITAT

Collected by pyrethrum knockdown on mossy tree trunks and logs in montane rainforest at 1200m. Collected December only.

ETYMOLOGY

Refers to the type locality, Lambs Head.

Philipis picta sp. nov.
(Figs 7D, 15E, 19A)

MATERIAL EXAMINED

HOLOTYPE: QMT13744; ♂, Mt. Finnigan Summit via Helenvale, NEQ, 3-5 Dec 1990, 1050m, Monteith, Sheridan, Roberts & Thompson, pyrethrum.

PARATYPES: 3 ♀, same data (ANIC, CBM, QM); 2 ♀, Mt. Finnigan Summit, NEQ, 30 Nov 1985, GM & DC, QM Berlesate No. 685, 15°48'S, 145°17'E, RF, 1100m, moss on trees (CBM, QM); 1 ♀, Mt. Finnigan Summit, NEQ, 29 Nov 1985, GM & DC, QM Berlesate No. 699, 15°48'S, 145°17'E, RF, 1100m, moss on trees (QM).

DIAGNOSIS

Rather small to medium-sized, piceous, quadrimaculate, with light apex and base of elytra and oblique and sinuate apical elytral spot, further distinguished from *P. bicolor* sp. nov. by not contrastingly coloured pronotum, less contrast-

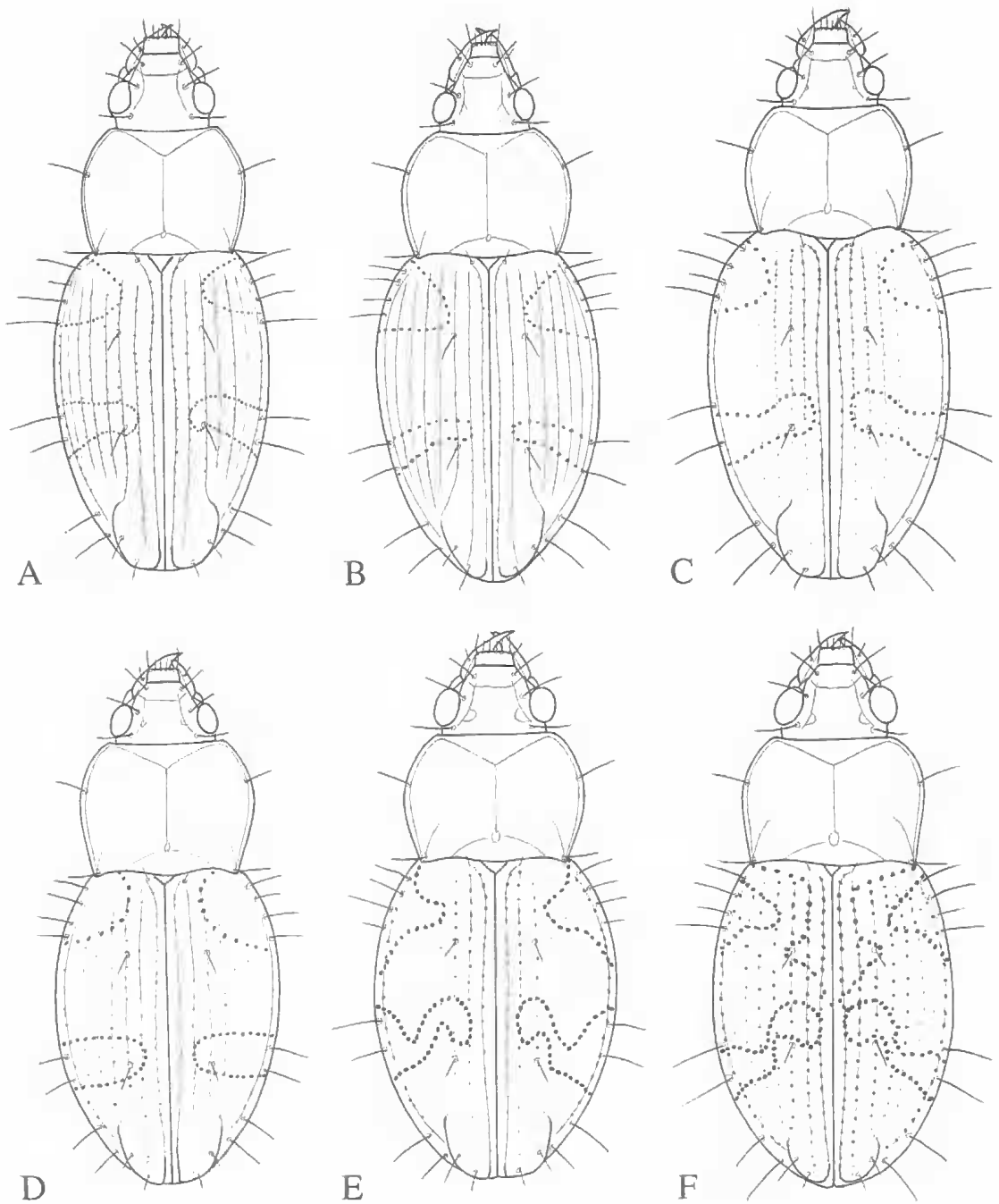

FIG. 15. Habitus. A, *Philipis rufescens* sp. nov. B, *P. perstriata* sp. nov. C, *P. ellioti* sp. nov. D, *P. agnicapitis* sp. nov. E, *Philipis picta* sp. nov. F, *P. bicolor* sp. nov. Lengths: 2.35mm; 2.05mm; 2.1mm; 2.25mm;2.3mm; 2.3mm.

ing elytral pattern, less deeply striate and punctate base of elytra, and short, on lower surface evenly curved aedeagus with very short apex.

DESCRIPTION

Measurements. Length: 2.18-2.35mm; width: 1.02-1.04mm. Ratios: Width pronotum/head: 1.48-1.51; width/length of pronotum: 1.45-1.49; width base/apex of pronotum: 1.35-1.40; width widest diameter/base of pronotum: 1.12-1.16; length/width of elytra: 1.31-1.34.

Colour. Head and dark parts of elytra dark piceous, pronotum, base, and apex of elytra reddish-piceous. A fairly vague, triangular, laterally wide spot behind shoulder attaining medially about 4th stria, a rather well delimited, oblique, slightly s-shaped fascia in posterior 2/5 medially attaining about 2nd stria, and posterior half of suture yellow to light reddish. Legs yellow, tibiae and tarsi slightly darker.

Head. Median antennomeres c. 1.3 x as long as wide. Microreticulation distinct, though superficial, reduced on vertex, about isodiametric to slightly transverse. Surface moderately glossy.

Pronotum. Transverse, convex, widest about in middle or slightly in front of it, base much wider than apex. Lateral margin posteriorly slightly convex to almost straight, fairly oblique. Posterior angles not fully rectangular, slightly obtuse, feebly produced over lateral part of base. Carina at posterior angle elongate, markedly oblique, slightly incurved. Anterior transverse sulcus deep, not interrupted. Posterior transverse sulcus deep, interrupted by a rather large fovea. Anterior lateral seta situated well behind anterior third of margin. Microreticulation present only at apex and base, absent on disk, about isodiametric, surface glossy.

Elytra. Short, convex, egg-shaped, widest about in middle. Lateral border evenly curved, extremely finely serrate and pilose. Sutural stria crenulate. 2nd-3rd striae, sometimes even 4th stria faintly impressed and coarsely, but very widely spaced punctate in basal half, outer striae very fine throughout, though usually just visible at high magnification. All, except of sutual and 2nd stria disappearing behind middle. At least 1st-2nd intervals slightly convex in basal half, sutural interval convex even to apex. 8th stria deeply impressed, anteriorly shallow, strongly punctate-crenulate, just attaining posterior marginal pore. Recurrent striole elongate, rather oblique, meeting position of 3rd stria. Anterior discal pore in anterior third, posterior pore slightly in front of posterior third. Microreticulation rather superficial, composed of irregular, moderately transverse meshes. Surface fairly glossy. Wings slightly shortened.

Lower surface. Metepisternum slightly longer than wide.

Male genitalia. Genital ring triangular, slightly asymmetric, moderately wide, apex rather narrow. Aedeagus short and compact, lower surface concave, apex very short and wide, widely rounded off. Parameres moderately elongate, both 5-setose.

Female genitalia. Stylomere 2 with stout dorsal ensiform seta situated rather medially.

Variation. Apart from some minor differences in relative shape of pronotum and in distinctness of elytral pattern, little variation noted.

DISTRIBUTION

Mt. Finnigan south of Cooktown, north Queensland. Known only from this mountain top.

HABITAT

Collected by pyrethrum knockdown and Berlese extraction of moss on trees in montane rainforest above 1050m. Collected November and December.

ETYMOLOGY

Refers to the striking elytral pattern.

Philipis bicolor sp. nov.
(Figs 3, 7E, 15F, 19A)

MATERIAL EXAMINED

HOLOTYPE: QMT13748; ♂, Mt. Demi, 7km SW of Mossman, NEQ, 29 Oct 1983, 1100m, D. K. Yeates & G. I. Thompson, Pyrethrum knockdown in RF.

PARATYPES: 11 ♂, 13 ♀, same data (ANIC, CBM, QM, USNM, ZSM).

DIAGNOSIS

Rather small to medium sized, black, quadrimaculate, with light apex and base of elytra and oblique and sinuate apical elytral spot, further distinguished from *P. picta* sp. nov. by contrastingly red pronotum, markedly contrasting elytral pattern, more deeply striate and punctate base of elytra, and rather elongate, on lower surface faintly bisinuate aedeagus with fairly elongate apex.

DESCRIPTION

Measurements. Length: 2.0-2.45mm; width: 0.92-1.15mm. Ratios: Width pronotum/head: 1.50-1.55; width/length of pronotum: 1.53-1.61; width base/apex of pronotum: 1.44-1.49; width

widest diameter/base of pronotum: 1.07-1.09; length/width of elytra: 1.32-1.36.

Colour. Head and dark parts of elytra very dark piceous, almost black. Pronotum, shoulders, basal third of inner two or three intervals, apex, suture, and lateral border of elytra, reddish. A semicircular, laterally wide spot behind shoulder attaining medially about 4th stria, and a very oblique, s-shaped fascia in posterior 2/5 medially attaining about 2nd stria, yellow. Both spots conspicuous and well delimited. Legs yellow.

Head. Median antennomeres c. 1.3 x as long as wide. Microreticulation distinct only on labrum and anterior border of clypeus, on frons very superficial, absent on vertex, about isodiametric to slightly transverse. Surface highly glossy.

Pronotum. Transverse, convex, widest about in middle or slightly in front of it, base much wider than apex. Lateral margin posteriorly feebly convex or almost straight, or even faintly concave in front of posterior angles, fairly oblique. Posterior angles rectangular, feebly produced over lateral part of base. Carina at posterior angle very elongate, markedly oblique, slightly incurved. Anterior transverse sulcus deep, not interrupted. Posterior transverse sulcus deep, interrupted by a rather large fovea. Anterior lateral seta situated well behind anterior third of margin. Microreticulation absent on disk, superficial at apex and base, surface glossy.

Elytra. Short, convex, egg-shaped, widest about in middle. Lateral border evenly curved, extremely finely serrate and pilose. Sutural stria crenulate, 2nd-5th striae, sometimes even 6th stria faintly impressed and all striae in basal half coarsely, but very widely spaced punctate. Three to four inner striae visible near apex. At least 1st-4th intervals slightly convex in basal half, sutural interval convex throughout. 8th stria deeply impressed, anteriorly shallower, strongly punctate, anteriorly even crenulate, just attaining posterior marginal pore. Recurrent striole elongate, rather oblique, meeting 3rd stria. Anterior discal pore behind anterior third, posterior pore slightly in front of posterior third. Microreticulation absent. Surface highly glossy. Wings slightly shortened.

Lower surface. Metepisternum slightly longer than wide.

Male genitalia. Genital ring triangular, rather asymmetric, moderately wide, apex rather narrow. Aedeagus rather short and compact, lower surface gently bisinuate, apex fairly elongate, wide, widely rounded off. Parameres moderately elongate, both 5-setose.

Female genitalia. Stylomere 2 with stout dorsal ensiform seta situated rather medially.

Variation. Apart from some minor differences of size, relative shape of pronotum, and siatinctness of pattern, little variation noted.

DISTRIBUTION

Mt. Demi south of Mossman, north Queensland. Known only from that mountain top.

HABITAT

Collected by pyrethrum knockdown on mossy tree trunks in montane rainforest at 1100m. Collected October only.

ETYMOLOGY

Refers to the strikingly bicoloured pattern.

Philipis geoffreyi sp. nov.
(Figs 7B, 16A, 19B)

MATERIAL EXAMINED

HOLOTYPE: QMT13767; ♂, 16°22'S, 145°13'E, 7km N. Mt. Spurgeon (Camp 2), NEQ, 17-19 Oct 1991, 1250m, Monteith & Janetzki, Pyrethrum, trees & logs. PARATYPE: 1 ♀, 16°24'S, 145°13'E, Stewart Ck., 4km NNE Mt. Spurgeon (Camp 1), NEQ, 1250-1300m, 15 Oct 1991, Pyr., GM & HJ (CBM).

DIAGNOSIS

Rather small, dark piceous, quadrimaculate, with distinct, triangular subbasal, and oblique and sinuate apical elytral spots, further distinguished from *P. minor* sp. nov. by larger size, wider pronotum, and shorter elytra.

DESCRIPTION

Measurements. Length: 2.12-2.16mm; width: 1.02-1.04mm. Ratios: Width pronotum/head: 1.51-1.55; width/length of pronotum: 1.55-1.57; width base/apex of pronotum: 1.42-1.46; width widest diameter/base of pronotum: 1.08-1.09; length/width of elytra: 1.29-1.31.

Colour. Dark piceous, pronotum and posterior half of suture of elytra, sometimes also base of elytra reddish-piceous. Pronotum distinctly lighter than head and elytra. Lateral border of elytra, a triangular, laterally wide spot behind shoulder attaining medially about 4th stria, and a conspicuous, very oblique, s-shaped fascia in posterior 2/5 medially attaining about 2nd stria, yellow. Both spots conspicuous and well delimited. Legs yellow.

Head. Median antennomeres c. 1.3 x as long as wide. Microreticulation distinct, though superfi-

cial, reduced on vertex, about isodiametric to slightly transverse. Surface moderately glossy.

Pronotum. Transverse, convex, widest about in middle, base much wider than apex. Lateral margin posteriorly slightly convex to almost straight, fairly oblique. Posterior angles rectangular, feebly produced over lateral part of base. Carina at posterior angle elongate, markedly oblique, slightly incurved. Anterior transverse sulcus deep, not interrupted. Posterior transverse sulcus very deep, interrupted by a large fovea. Anterior lateral seta situated well behind anterior third of margin. Microreticulation very superficial, slightly transverse, surface rather glossy.

Elytra. Short, highly convex, egg-shaped, widest about in middle. Lateral border evenly curved, extremely finely serrate and pilose. Sutural stria crenulate. 2nd-5th striae slightly impressed and coarsely punctate at least in basal half, outer striae very fine even in anterior half. All, except of sutual and 2nd stria disappearing behind middle. At least 1st-3rd intervals slightly convex in basal half, sutural interval convex throughout. 8th stria deeply impressed, anteriorly shallow, strongly punctate-crenulate, just attaining posterior marginal pore. Recurrent striole elongate, rather oblique, meeting position of 3rd stria. Anterior discal pore in anterior third, posterior pore slightly in front of posterior third. Microreticulation distinct, though somewhat superficial, composed of rather irregular, moderately transverse meshes. Surface moderately glossy. Wings slightly shortened.

Lower surface. Metepisternum slightly longer than wide.

Male genitalia. Genital ring asymmetrically triangular, fairly narrow, apex rather wide. Aedeagus moderately short and compact, lower surface almost imperceptibly bisinuate, apex short, rounded off. Parameres rather elongate, both 5-setose.

Female genitalia. Stylomere 2 with stout dorsal ensiform seta situated rather medially.

Variation. Apart from some minor differences in depth of ground colour, little variation noted.

DISTRIBUTION

To the north of Mt. Spurgeon, western part of Carbine Tableland, north Queensland.

HABITAT

Collected by pyrethrum knockdown on mossy tree trunks in montane rainforest above 1250m. Collected October.

ETYMOLOGY

Named in honour of the collector of most specimens of the genus *Philipis*, Dr. Geoffrey Monteith of the Queensland Museum.

Philipis minor sp. nov.
(Figs 8A, 16B, 19B)

MATERIAL EXAMINED

HOLOTYPE: QMT13768; ♂, Mossman Bluff Track, 10km W Mossman, NEQ, 21 Dec 1989, 1180m, Monteith & Thompson, pyrethrum (Site 8).

DIAGNOSIS

Small, dark piceous, quadrimaculate, with distinct, triangular subbasal and oblique and sinuate apical elytral spot, further distinguished from *P. geoffreyi* sp. nov. by lesser size, narrower pronotum, and longer elytra.

DESCRIPTION

Measurements. Length: 2.0mm; width: 0.96mm. Ratios: Width pronotum/head: 1.45; width/length of pronotum: 1.47; width base/apex of pronotum: 1.34; width widest diameter/base of pronotum: 1.11; length/width of elytra: 1.35.

Colour. Dark piceous, posterior half of suture and apex of elytra reddish-piceous. Pronotum not lighter than head and elytra. Lateral border of elytra, a triangular, laterally wide spot behind shoulder attaining medially about 4th stria, and a conspicuous, very oblique, s-shaped fascia in posterior 2/5 medially attaining about 2nd stria, yellow. Both spots conspicuous and well delimited. Legs yellow.

Head. Median antennomeres c. 1.3 x as long as wide. Microreticulation superficial, reduced on vertex, about isodiametric to slightly transverse. Surface moderately glossy.

Pronotum. Fairly transverse, convex, widest well in front of middle, base much wider than apex. Lateral margin posteriorly straight, fairly oblique. Posterior angles rectangular, feebly produced over lateral part of base. Carina at posterior angle elongate, markedly oblique, slightly incurved. Anterior transverse sulcus deep, not interrupted. Posterior transverse sulcus very deep, interrupted by a large fovea. Anterior lateral seta situated well behind anterior third of margin. Microreticulation very superficial, slightly transverse, surface rather glossy.

Elytra. Rather short, highly convex, egg-shaped, widest about in middle. Lateral border evenly curved, extremely finely serrate and pilose. Sutural stria crenulate. 2nd-5th striae fairly impressed and coarsely punctate at least in basal

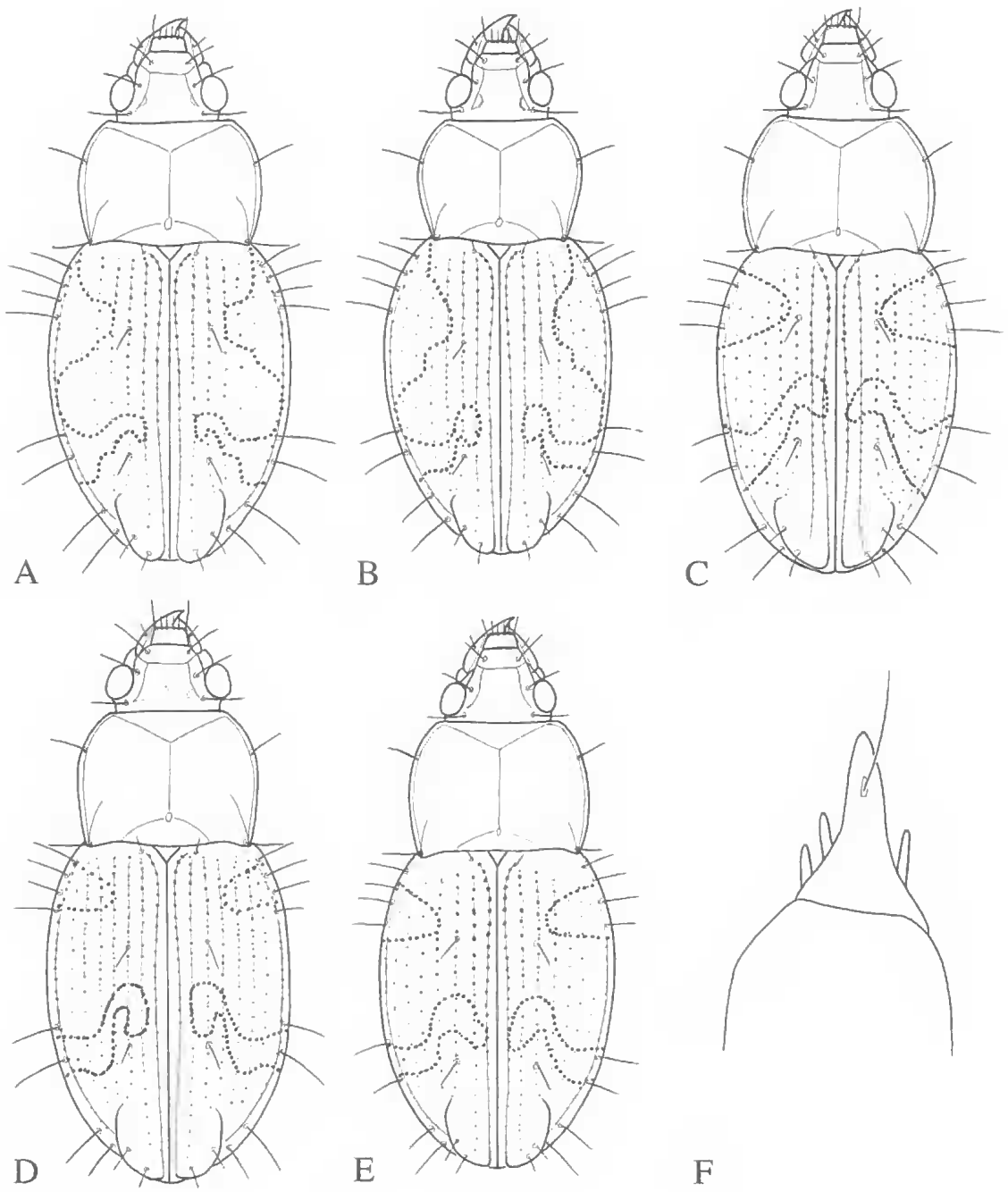

FIG. 16. Habitus. A, *P. geoffreyi* sp. nov. B, *P. minor* sp. nov. C, *Philipis sinuata* sp. nov. D, *P. distinguenda* sp. nov. E, *P. lustrans* sp. nov. F, *P. quadraticollis* sp. nov. ♀ styli. Lengths: 2.65mm; 2.6mm; 2.4mm; 2.15mm; 2.0mm.

half, outer striae very fine even in anterior half. All, except of sutural and 2nd stria disappearing behind middle. At least 1st-4rd intervals slightly convex in basal half, sutural interval convex throughout. 8th stria deeply impressed throughout, strongly punctate-crenulate, attaining posterior marginal pore. Recurrent striole elongate, rather oblique, meeting position of 3rd stria. Anterior discal pore in anterior third, posterior pore slightly in front of posterior third. Microreticulation distinct, though somewhat superficial, composed of rather irregular, moderately transverse meshes. Surface moderately glossy. Wings slightly shortened. Variation unknown.

Lower surface. Metepisternum slightly longer than wide.

Genitalia. Male genital ring asymmetrically triangular, moderately wide, apex rather narrow. Aedeagus rather short and compact, lower surface distinctly bisinuate, apex short, wide, widely rounded off. Parameres moderately elongate, both 5-setose, most posterior seta on lower surface rather removed from penultimate. On upper side behind last seta with an additional puncture, but without seta. Female genitalia unknown.

DISTRIBUTION

Mountains west of Mossman, north Queensland. Known only from type locality.

HABITAT

Collected by pyrethrum knockdown on mossy tree trunks in montane rainforest at 1180m. Collected December only.

ETYMOLOGY

Refers to the smaller size compared with the closely related species *P. geoffreyi*.

Philipis sinuata sp. nov.
(Figs 8B, 16C, 19B)

MATERIAL EXAMINED

HOLOTYPE: QMT13769; ♂, Mt. Bartle-Frere, NEQ, summit creek, 24 Sept 1981, G. Monteith & D. Cook, QM Berlesate No. 304, rainforest, 1500m, sieved litter. PARATYPES: 7 ♂, 2 ♀, same data (CBM, QM); 2 ♂, Mt Bartle Frere, NEQ, Sth. Peak Summit, 1620m, 6-8 Nov 1981, EW/QM Pyr. (CBM, QM); 1 ♂, Mt Bartle Frere, NEQ, Campsite, 1500m, 27 Dec 1989, GM, Pyr., trees & rocks (QM); 1 ♀, Mt. Bartle Frere, NEQ, NW-Centre Peak, 16 Sept 1982, 1500m, GM & SM (QM); 2 ♂, 4 ♀, Bellenden Ker, Centre Peak Summit, NEQ, 10 Apr 1979, GM, QM Berlesate No. 8, 17°16'S, 145°51'E, RF, 1500m, moss on trees (QM, ZSM); 1 ♀, Bellenden Ker Summit, NEQ, 10 June 1980, GM, QM Berlesate No. 221, 17°16'S, 145°52'E, RF, 1561m, moss on trees (QM); 7 ♂, 4 ♀, Bellenden Ker Range, NEQ, Summit TV Stn., 1560m, 17 Oct-5 Nov 1981, EW/QM Pyr. (ANIC, CBM, QM, USNM, ZSM); 2 ♂, Bellenden Ker Range, NEQ, Summit TV Stn., 1560m, 25-31 Oct 1981, EW/QM, QM Berlesate No. 373, 17°16'S, 145°51'E, RF, moss on trees (QM); 2 ♂, 1 ♀, Bellenden Ker Range, NEQ, Summit TV Stn., 1560m, 1-7 Nov 1981, EW/QM, QM Berlesate No. 346, 17°16'S, 145°51'E, RF, moss on trees & rocks (CBM, QM); 1 ♂, Bellenden Ker Range, NEQ, Summit TV Stn, 29 Apr-2 May 1983, GM, DY, QM Berlesate No. 562, 17°16'S, 145°51'E, RF, 1560m, moss (QM); 32 ♂, 16 ♀, Bellenden-Ker Range, NEQ, Summit TV Stn., 1550m, 28 Oct 1983, GM, DY & GT, Pyr. in RF (CBM, QM); 1 ♂, 2 ♀, 17°16'S, 145°52'E, Bellenden Ker summit, NEQ, 8 Oct 1991, 1560m, GM & HJ, Pyr., trees & logs (QM).

DIAGNOSIS

Large, dark piceous, quadrimaculate, with oblique, markedly sinuate apical elytral spot, further distinguished by distinct microreticulation on frons and elytra, wide pronotum with remarkably wide base, short aedeagus with faintly curved lower surface, and 5-setose right paramere.

DESCRIPTION

Measurements. Length: 2.6-2.75mm; width: 1.2-1.3mm. Ratios: Width pronotum/head: 1.65-1.73; width/length of pronotum: 1.51-1.56; width base/apex of pronotum: 1.51-1.59; width widest diameter/base of pronotum: 1.09-1.11; length/width of elytra: 1.34-1.36.

Colour. Dark piceous, pronotum, base of elytra and suture slightly lighter. Elytra at shoulder with a rather ill delimited, triangular, light reddish spot attaining about position of 4th stria. In posterior 2/5 of elytra with a conspicuous, well delimited, markedly s-shaped, yellowish stripe attaining about sutural stria. Medio-anteriorly this stripe is markedly bent and encircles the posterior elytral pore. Both elytral pores situated within a small, light spot. Legs yellow, barely infuscate.

Head. Median antennomeres c. 1.8 x as long as wide. Microreticulation very distinct on labrum and anterior part of clypeus, distinct, though fairly superficial on frons and vertex, about isodiametric to slightly transverse. Surface fairly glossy.

Pronotum. Transverse, rather convex, widest behind middle, base much wider than apex. Lateral margin posteriorly little curved, though rather oblique, at posterior angles perceptibly incurved. Posterior angles rectangular, though somewhat obtuse, distinctly produced over lateral part of base. Carina at posterior angle elon-

gate, markedly oblique, slightly incurved. Anterior transverse sulcus rather deep, not interrupted. Posterior transverse sulcus deep, interrupted by a large fovea. Anterior lateral seta situated well behind anterior third of margin. Microreticulation distinct, though superficial, almost isodiametric, surface rather glossy.

Elytra. Moderately short and convex, egg-shaped, widest at or slightly in front of middle. Lateral border evenly curved, extremely finely, almost not perceptibly, serrate and pilose. Sutural stria crenulate. 2nd stria distinctly impressed in basal half, 3rd-5th striae at base still faintly impressed, outer striae not impressed, though all striae easily visible as rows of rather coarse punctures that laterally and apically become finer. 1st interval convex throughout, 2nd-4th intervals near base more or less distinctly convex. Inner four striae just visible near apex. 8th stria deeply impressed throughout, strongly punctate, attaining posterior marginal pore. Recurrent striole elongate, rather oblique, meeting 3rd stria. Anterior discal pore well behind anterior third, posterior pore in front of posterior third. Microreticulation distinct, though superficial, consisting of rather irregular, transverse meshes. Surface moderately glossy. Wings shortened, though still surpassing elytra.

Lower surface. Metepisternum about as long as wide.

Male genitalia. Genital ring asymmetrically triangular, narrow, apex rather wide. Aedeagus rather large, though short and compact, lower surface feebly concave, apex very short, widely rounded off. Parameres moderately elongate, both 5-setose.

Female genitalia. Stylomere 2 with stout dorsal ensiform seta situated rather medially.

Variation. A rather homogenous species. There is, however, apparently some allometric variation, since large specimens tend to have relatively wider pronotum with wider base.

DISTRIBUTION

Bellenden Ker Range, north Queensland.

HABITAT

Collected by pyrethrum knockdown on mossy trees and by Berlese extraction of moss and litter in montane rainforest above 1500m. Species occurs only on the very summits of the range.

ETYMOLOGY

Refers to the sinuate, markedly s-shaped posterior elytral fascia.

Philipis distinguenda sp. nov.
(Figs 8C, 16D, 19B)

MATERIAL EXAMINED

HOLOTYPE: QMT13833; ♂, Mossman Bluff Track 10km W Mossman, NEQ, 17 Dec 1988, 1200m, Monteith & Thompson, pyrethrum/trees & logs.

PARATYPE: 1 ♂, Mossman Bluff Track 6km W Mossman, NEQ, 16 Dec 1988, 480m, GM & GT, Pyr./trees & logs (CBM).

DIAGNOSIS

Large, dark piceous, quadrimaculate, with oblique, markedly sinuate apical elytral spot, further distinguished from closely related *P. sinuata* sp. nov. by narrower pronotum with narrower base, longer elytra, and slightly longer aedeagus with gently bisinuate lower surface and slightly longer apex.

DESCRIPTION

Measurements. Length: 2.6-2.65mm; width: 1.18-1.24mm. Ratios: Width pronotum/head: 1.59-1.60; width/length of pronotum: 1.45-1.47; width base/apex of pronotum: 1.45-1.47; width widest diameter/base of pronotum: 1.10-1.12; length/width of elytra: 1.38-1.41.

Colour. Head and dark parts of elytra rather dark piceous, pronotum, basal third, apex, lateral borders, and suture of elytra slightly lighter, reddish-piceous. Elytra at shoulder with a very ill delimited, triangular, yellowish spot attaining about position of 4th stria. In posterior 2/5 of elytra with a conspicuous, well delimited, markedly s-shaped, yellowish stripe medially attaining about 2nd stria. Medio-anteriorly this stripe is sharply bent and touches the posterior elytral pore. Legs yellow, tibiae faintly darker.

Head. Median antennomeres c. 1.8 x as long as wide. Microreticulation distinct on labrum and anterior part of clypeus, fairly superficial on frons and vertex, about isodiametric to slightly transverse. Surface fairly glossy.

Pronotum. Transverse, rather convex, widest about in middle, base much wider than apex. Lateral margin posteriorly little curved, though rather oblique, at posterior angles perceptibly incurved. Posterior angles rectangular, though at tip slightly obtuse, distinctly produced over lateral part of base. Carina at posterior angle elongate, markedly oblique, slightly incurved. Anterior transverse sulcus rather deep, not interrupted. Posterior transverse sulcus deep, interrupted by a large fovea. Anterior lateral seta situated well behind anterior third of margin.

Microreticulation distinct, though superficial, almost isodiametric, surface rather glossy.

Elytra. Moderately short and convex, egg-shaped, widest at or slightly in front of middle. Lateral border evenly curved, extremely finely, almost not perceptibly, serrate and pilose. 1st and 2nd striae deeply impressed, crenulate. All other striae also more or less impressed in basal half. Striae rather coarsely punctate-crenulate, though puncturation laterally and apically finer. 1st and 2nd intervals convex throughout, 3rd-5th intervals in basal half rather distinctly convex, outer intervals just feebly convex. Inner four striae visible near apex. 8th stria deeply impressed throughout, strongly punctate, attaining posterior marginal pore. Recurrent striole elongate, rather oblique, meeting 3rd stria. Anterior discal pore well behind anterior third, posterior pore in front of posterior third. Microreticulation distinct, though superficial, consisting of slightly irregular, transverse meshes. Surface moderately glossy. Wings slightly shortened, though still surpassing elytra.

Lower surface. Metepisternum c. 1.2 x as long as wide.

Genitalia. Male genital ring triangular, narrow, slightly asymmetric, apex rather wide. Aedeagus short and compact, lower surface feebly bisinuate, apex very short, widely rounded off. Parameres, especially right paramere, short and wide, both 5-setose. Female genitalia unknown.

Variation. Due to few available specimens little variation noted.

DISTRIBUTION

Track to Mossman Bluff west of Mossman, north Queensland. Known from only two localities on this track.

HABITAT

Collected by pyrethrum knockdown on mossy trees and logs in rainforest at 480m and 1200m height. Collected December only.

ETYMOLOGY

Refers to the close external similarity with *P. sinuata*.

Philipis lustrans sp. nov.
(Figs 8D, 16E, 19B)

MATERIAL EXAMINED

HOLOTYPE: QMT13834; ♂, North Bell Peak, NEQ, Malbon Thompson Ra., 20 Nov 1990, 1000m, Monteith & Thompson, pyrethrum-trees & logs.

PARATYPES: 6 ♂, 3 ♀, same data (ANIC, CBM, QM, USNM, ZSM); 3 ♂, 3 ♀, Bellenden Ker Range, NEQ, Cable Tower 3, 1054m, 17 Oct-5 Nov 1981, EW/QM Pyr. (CBM, QM); 1 ♂, 17°16'S, 145°50'E, Massey/Bellenden Ker saddle, NEQ, 9 Oct 1991, 950m, GM, HJ & DC, Pyr., trees & logs (QM); 1 ♂, 1 ♀, 17°14'S, 145°48'E, Massey Ra., NEQ, 6 km NW of Bellenden Ker, 1150m, 11 Oct 1991, Pyr., GM & HJ (QM); 1 ♂, Mt Bartle Frere, NEQ, West Side, 1050m, 8 Dec 1990, GM, GT & RS, Pyr.-trees & rocks (QM); 4 ♂, Lambs Head, 10km W Edmonton, NEQ, 10 Dec 1989, 1200m, GM, GT & HJ, Pyr., logs & trees (QM); 4 ♂, 1 ♀, Lambs Head, 10km W Edmonton, NEQ, 1200m, 11 Dec 1989, (2nd Tower) GM, GT & HJ, Pyr., logs & trees (CBM, QM).

DIAGNOSIS

Medium-sized, dark piceous, quadrimaculate, with oblique, markedly sinuate apical elytral spot, further distinguished from related species by narrower base of the wide pronotum, absence of microreticulation on frons and elytra, and short aedeagus with gently bisinuate lower surface.

DESCRIPTION

Measurements. Length: 2.2-2.5mm; width: 1.0-1.16mm. Ratios: Width pronotum/head: 1.56-1.62; width/length of pronotum: 1.51-1.57; width base/apex of pronotum: 1.46-1.51; width widest diameter/base of pronotum: 1.09-1.13; length/width of elytra: 1.33-1.37.

Colour. Fairly dark piceous, suture, sometimes also base and apex of elytra and even pronotum faintly lighter. Elytra behind shoulder with a moderately conspicuous, medially fairly ill delimited, about triangular, light reddish spot attaining about position of 4th stria. In posterior 2/5 of elytra with a conspicuous, well delimited, oblique, markedly s-shaped, yellowish or light reddish fascia attaining sutural stria. The sharply bent median part of the fascia situated well in front of posterior discal seta. Legs yellowish to light reddish.

Head. Median antennomeres c. 1.75 x as long as wide. Microreticulation very indistinct, highly superficial on most of head, absent on vertex, about isodiametric to slightly transverse. Surface highly glossy.

Pronotum. Rather transverse and convex, widest about in middle, base much wider than apex. Lateral margin posteriorly little curved, rather oblique. Base distinctly narrower than widest part. Posterior angles almost rectangular, slightly obtuse, faintly produced over lateral part of base. Carina at posterior angle elongate, rather oblique, slightly incurved. Anterior transverse sulcus deep, not interrupted. Posterior transverse sulcus

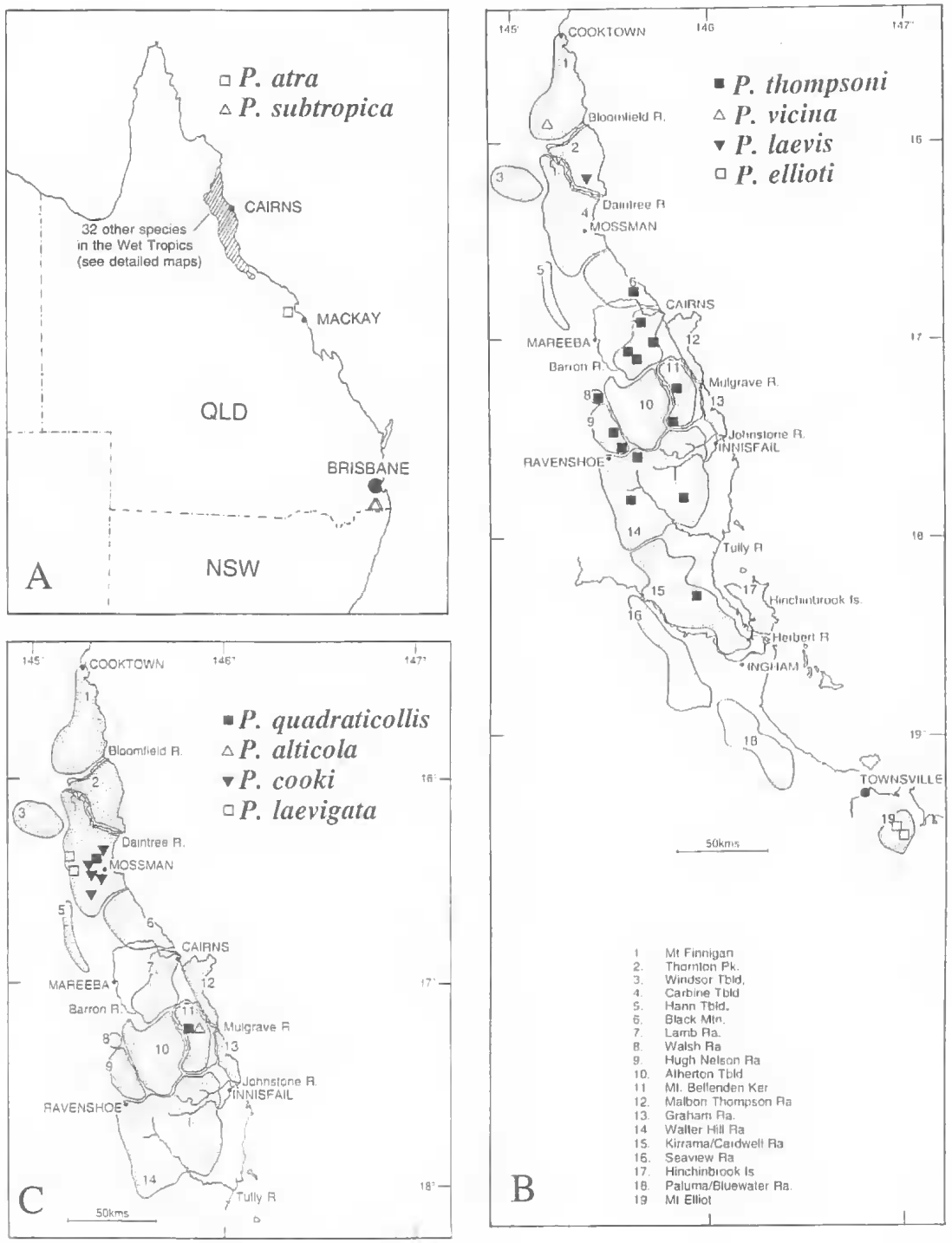

FIG. 17. Distribution of *Philipis* species. A, Queensland showing *P. atra* sp. nov. and *P. subtropica* sp. nov. plus combined extent of 33 tropical species. B, Wet tropics region showing *P. thompsoni* sp. nov., *P. vicina* sp. nov., *P. laevis* sp. nov., *P. ellioti* sp. nov. and the 19 rainforest survey zones used in the collection program. C, *P. quadraticollis* sp. nov., *P. alticola* sp. nov., *P. cooki* sp. nov. and P. laevigata sp. nov.

deep, interrupted by large fovea. Anterior lateral seta situated well behind anterior third of margin. Microreticulation very superficial to barely perceptible, apparently slightly transverse, surface highly glossy.

Elytra. Moderately short and convex, egg-shaped, widest slightly in front of middle. Lateral border evenly curved, extremely finely serrate and pilose. 1st and 2nd striae moderately impressed throughout. 3rd-5th striae more or less distinctly impressed in basal half, even outer striae sometimes faintly impressed, and all striae rather coarsely punctate. 1st and 2nd intervals gently convex throughout, 3rd-5th intervals gently convex in basal half, sometimes even outer intervals slightly convex, though apically depressed. Only four to five inner striae visible at apex. 8th stria deeply impressed throughout, distinctly punctate, attaining posterior marginal pore. Recurrent striole elongate, rather oblique, meeting 3rd stria. Anterior discal pore about in anterior third, posterior pore about in posterior third. Microreticulation extremely superficial, just perceptible only laterally and near apex, consisting of irregular, transverse meshes. Surface highly glossy. Wings slightly shortened, though yet longer than elytra.

Lower surface. Metepisternum c. 1.2 x as long as wide.

Male genitalia. Genital ring almost regularly triangular, moderately wide, feebly asymmetric, apex rather narrow. Aedeagus very short and compact, lower surface basally faintly bisinuate, in apical third curved down, apex rather narrow, short, rounded off. Apical part of aedeagus conspicuously covered with large microtrichia. Parameres rather short, both 5-setose.

Female genitalia. Stylomere 2 with stout dorsal ensiform seta situated rather medially.

Variation. Apart from minor differences in shape of pronotum and degree of microreticulation on pronotum and elytra, little variation noted.

Distribution

Mountains at and near the eastern border of Atherton Tableland in the Lamb, Bellenden Ker, and Malbon Thompson Ranges, north Queensland.

Habitat

Collected by pyrethrum knockdown on mossy tree trunks, logs, and rocks in montane rainforest between 950-1200m. Collected October to December.

Etymology

Refers to the glossy surface as compared with related species.

NATURAL HISTORY

Available data indicate that all species of *Philipis* are arboreal and inhabit rainforest living on mossy tree trunks. Most specimens were captured by pyrethrum spraying of the moss on the trunks of rainforest trees. Even those specimens that have been collected by Berlese extraction were sampled from moss litter from vertical surfaces. Almost no specimens have been collected by hand sampling which is perhaps due to their small size and their habits under the cover of the moss. Only one specimen has been so far found under bark. This could be due to failure of appropriate sampling, but more likely it reflects their absence from that habitat.

Despite the time, energy and inspiration devoted by G. Monteith and his collegues, the number of available specimens remains small, excepting a few more common species. Difficulties in obtaining such specimens may be illustrated by the fact that P. J. Darlington, certainly a skilful collector in the rainforests of Australia, recovered only a single specimen of this genus during his long stay in the area (actually his son collected the specimen). Occurrence of almost all species high on mountain tops, some of which are rather remote, makes their collection difficult. In general, collecting work means a strenuous ascent often through dense montane rainforest to mountain tops, and careful sampling was hindered by wet weather. Perhaps these beetles are actually more common than we know, and additional appropriate sampling work may bring to light even more species and much more material.

Most collecting took place from October to December just before onset of the wet season. Thus the actual main activity period of these beetles is unclear. According to G. Monteith (pers. comm.) they are less common during the dry season, hence I think that the activity period of these beetles is the wet season and the few months before, when storms begin to bring some rain. No specimens have been so far recorded at light, although several species are fully winged and may be able to fly. According to G. Monteith no specimen has been found in the large series of flight intercept traps that were run during the sample periods. Hence, species of *Philipis* apparently fly very rarely. But flight may be of no

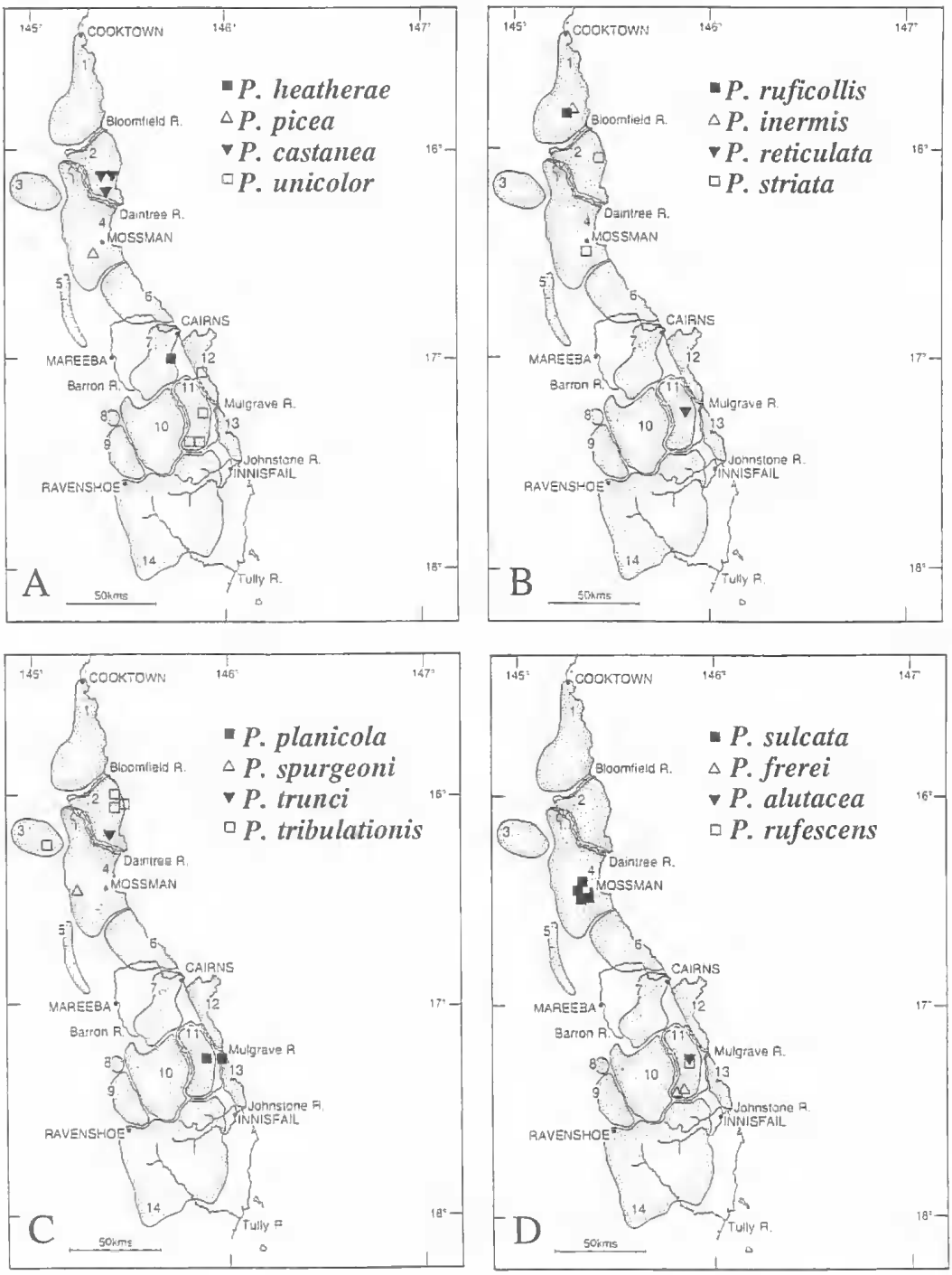

FIG. 18. Distribution of *Philipis* species. A, *P. heatherae* sp. nov., *P. picea* sp. nov., *P. castanea* sp. nov. and *P. unicolor* sp. nov. B, *P. ruficollis* sp. nov., *P. inermis* sp. nov., *P. reticulata* sp. nov. and *P. striata* sp. nov.. C, *P. planicola* sp. nov., *P. spurgeoni* sp. nov., *P. trunci* sp. nov. and *P. tribulationis* sp. nov. D, *P. sulcata* sp. nov., *P. frerei* sp. nov., *P. alutacea* sp. nov. and *P. rufescens* sp. nov.

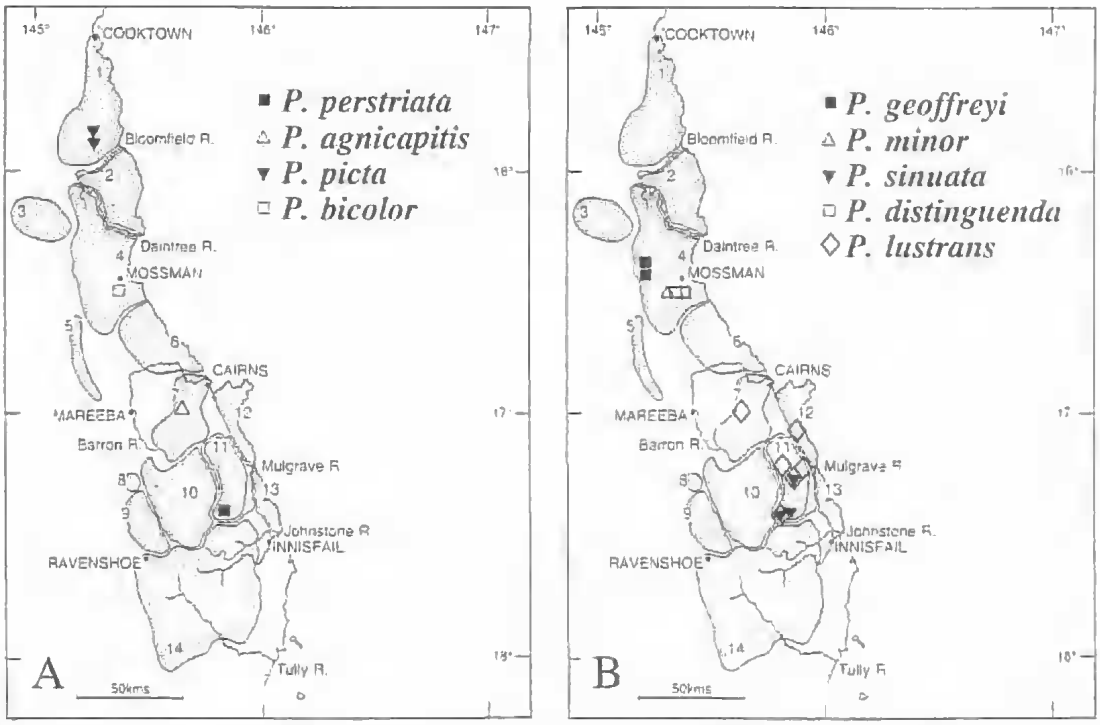

FIG. 19. Distribution of *Philipis* species. A, *P. perstriata* sp. nov., *P. agnicapitis* sp. nov., *P. picta* sp. nov. and *P. bicolor* sp. nov. B, *P. geoffreyi* sp. nov., *P. minor* sp. nov., *P. sinuata* sp. nov. and *P. lustrans* sp. nov.

advantage for beetles living in dense montane rainforest. Many species, however, possess reduced wings and are flightless.

Nothing is known on habits and life cycles, on diet, enemies, mating and reproduction, and no larvae have been detected. Since none have been seen runnning about, nothing is known on the daily period of activity, perhaps they are rather nocturnal.

On several occasions, and even within the same samples, different species have been observed occurring together. However it is unknown, whether they were from the same tree, because most samples include material from several trees. Nothing is also known about their possible preference for different tree or moss species.

A striking feature that will be important for the following biogeographical treatment is the occurrence of almost all species (except for *P. planicola* and *P. striata*) in montane rainforest mainly above 900m. A further feature is the extremely limited ranges of most species that have been observed usually on only a single mountain top, far less commonly on a mountain range or on a group of adjacent ranges. Only one species (*P. thompsoni*) occupies a really wide range throughout a larger part of the overall wet tropics region of north Queensland.

In conclusion it must regrettably be stated that we still know extremely little about the natural history of these beetles in spite of the enormous collecting efforts of Geoffrey Monteith and his co-workers.

RECONSTRUCTED PHYLOGENY

PHYLOGENETIC STATUS

Philipis is a genus of basically plesiomorphic tachyine beetles which nevertheless shows some spezialized or apomorphic characters. Erwin (1973) when revising the similarly partly arboreal neotropical *Xystosomus*, noted some of these primitive characters that are likewise present in the Australian *Philipis*. In a numerical cladistic analysis of the higher categories of Bembidiini - using the Hennig 86 program - Erwin (pers. comm.) found that *Philipis* keys out as the sister group of all the New World xystosomines. This would affirm the plesiomorphic status and perhaps also the close relationship of both lineages because plesiomorphic species of the *Xystosomus* lineage exhibit some character states present only

TABLE 2. Character states and their phylogenetic value in *Philipis*.

	Character	plesiomorphic	apomorphic
1	Size	medium-sized to large	very small
2	Shape of elytra	elongate, depressed	short, convex 2' - very short and highly convex
3	Surface of elytra	even	impressed in anterior third
4	Number of elytral striae present	all striae present and well developed	7th-5th striae reduced, less distinct 4' - 7th-5th striae absent 4" - only two inner striae present 4'" - only sutural stria present
5	Length of striae	striae fully developed	striae posteriorly shortened
6	Depth of striae	striae deeply impressed	only inner 4 striae impressed 6' - only inner 3 striae impressed 6" - only inner 2 striae impressed 6'" - only sutural stria impressed
7	Puncturation of striae	striae punctate	striae impunctate
8	Shape of striae	2nd-7th striae normally shaped	all striae deeply sulcate
9	Apical striole	elongate, curved inwards, meets 3rd stria	shortened, not curved inwards, not meeting 3rd stria
10	Microreticulation of pronotum	present, distinct	reduced or absent
11	Microreticulation of elytra	present, distinct	reduced, superficial 11' - completely absent
12	Colour of pronotum	blackish-piceous	reddish, contrasting
13	Colour of elytra	blackish-piceous	13a - reddish 13b - deep black
14	Elytral pattern	present, consisting of an apical macula	14a - present, consisting of a basal and an apical macula each 14b - absent
15	Shape of posterior elytral macula	circular or slightly transverse	elongate, oblique 15' - markedly s-shaped 15'
16	Distinctness of elytral maculae	rather inconspicuous	distinct, sharply bordered 16' - accentuate, set off by a conspicuous dark background
17	Colour of sutural interval	unicolourous	contrastingly reddish
18	Colour of space around discal elytral punctures	unicolourous	contrastingly light
19	Aedeagus	normal shaped, with short apex, lower surface straight	19a - apex elongate 19b- lower surface sinuate or bisinuate 19c - very short, compact, curved 19d - apex elongate, slender, at base incised

in *Bembidion* sensu lato, but generally not in Tachyini. Should this close relation be proved, this would have a major impact on biogeographic and evolutionary questions of the tribe Tachyini in general.

PHYLOGENETIC RELATIONS

Certainly all species of *Philipis* are closely related as indicated by their uniform appearance, colour, pattern, and external and genitalic morphology. Hence it is difficult to deal with the phylogenetic relations at the specific level, because parallel evolution presumably has been a very common event, and, on the other hand, striking morphological differences are rare and present only in few highly aberrant species. In my attempted evaluation of phylogenetic relations, several morphoclines from plesiomorphic to more or less highly apomorphic states were found, but in many cases it is obvious that evolution of a comparable or even the same apomorphic character status has occurred twice or even several times. In other characters it is still uncertain, whether apomorphic stages of the morphocline are synapomorphic, i.e. whether species exhibiting the same apomorphic character states are actually related. Such states which have been certainly evolved independently are marked with numbers in the character matrix below.

For better comparison a summary of the measures and ratios of all species is included that

illustrates some of the differences in size and body shape (Table 1). Although the characters used and their presumed plesiomorphic and apomorphic states are shown in Tables 2 & 3, some characters, especially those that build up morphoclines, are explicitly discussed below.

1. *Size*. Comparison with other genera of Tachyini, especially *Xystosomus* and allies, convinces me that very small size is apomorphic rather than plesiomorphic. Small size may be advantageous for a beetle living in the often short moss growing on tree trunks. Size reduction may have occurred repeatedly in different lineages of the genus.

2. *Shape of elytra*. The more elongate, depressed shape of the elytra in the *quadraticollis*-group (*P. quadraticollis*, *P. cooki*, *P. laevigata*, *P. alticola*, *P. heatherae*, and, to a lesser degree, also *P. castanea* and *P. picea*) is presumably the plesiomorphic state, and the short and usually highly convex elytra of certain species - best evolved in *P. sulcata* - are apomorphic. Furthermore the convex shape of the elytra is commonly combined with reduction of elytral striation and extensive reduction or even complete loss of microreticulation, which are both likewise apomorphic states. The tendency to evolve a rather globular body shape is perhaps generally common to moss- and fungus-inhabiting beetles. But which advantage the smooth, glossy integument should bear, is uncertain. Perhaps it has a water-repellent function.

4-8. *Development of elytral striae*. Certainly the full set of elytral striae is the plesiomorphic state, as in other genera. Complete reduction of striae, or shortening at base and apex, or reduction of depth of striae are therefore apomorphic states that make up morphoclines to the final state, where only the sutural stria is present. Originally the striae are punctate or punctate-crenulate, therefore reduction of puncturation, but at the same time channelling of all striae, are different apomorphic states that may eventually lead to elytra that have all striae deeply channelled but impunctate. Reduction of striae is commonly combined with loss of microreticulation, but in some species it is not. All these reductions presumably occurred independently in different lineages, without our exact knowing of how many times they occurred.

9. *Form of apical striole*. Although the lateral position of the apical striole is presumably a plesiomorphic character of the whole genus, the plesiomorphic state within the genus may be a curved apical striole that meets the 3rd stria or its position. The almost straight, barely incurved striole in some species may be therefore a secondary, apomorphic state.

10, 11. *Loss of microreticulation*. Certainly apomorphic, but it may be due to parallel evolution, like most other reductions, in several species.

12, 13. *Colour of surface*. Uniformly piceous or blackish colour is perhaps the plesiomorphic state, whereas vivid colouration of pronotum and/or elytra are apomorphic states, the advantage of which, however, is obscure.

14-18. *Elytral pattern*. It is uncertain, whether unspotted or uniplagiate elytra are the plesiomorphic status in *Philipis*, since there are good reasons for both opinions. Out-group comparison of the closest relatives reveal that species of the *Xystosomus* lineage are generally unspotted, but in some other tachyine genera presence of an apical spot seems to be the plesiomorphic status. In the species of the apomorphic species group of *Philipis* that combines rather short, convex species, however, both unspotted species (*P. unicolor*, *P. atra*) are in some other respects rather apomorphic (markedly short, convex body shape, reduction of striation, absence of microreticulation). In these species at least loss of elytral pattern is perhaps secondary.

The plesiomorphic state of the elytral pattern when it is present is certainly the unimaculate one, with the apical macula about circular or at most vaguely transverse. The bimaculate pattern and the various oblique to markedly s-shaped forms of the apical macula, and the pronounced colour of the maculae on a dark background are apomorphic states that in some lineages form morphoclines. Conspicuous colourations of suture and of discal punctures are found in single species only and are special features of these species.

Therefore, the basic branching of the cladogram is rather dependent on deciding whether absence of elytral pattern is plesiomorphic or apomorphic. Thus a basic branching different from that chosen in the cladogram cannot be completely excluded, although it seems to me less probable.

19. *The aedeagus*. Basically very similar throughout the genus. Some unusual modifications of shape and form of apex are apomorphic, but may be special features or autapomophic states of single species only and thus of little value for the reconstruction of the phylogenetic relations.

TABLE 3. Character states in the species of *Philipis*, numbered as in Table 2. -: plesiomorphic state; 1, 2 etc.: apomorphic state, different apomorphic states distinguished by lower case letters. States of a morphocline indicated by: ', '', '''. Comparable or similar apomorphic states that have been likely convergently evolved are marked by numbers: [1], [2] etc.

Philipis species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
quadraticallis										10	11				15^1				
alticola			3	4	5	6'									15^1				
coaki			3	4'	5	6''				10	11				15^1				
laevigata			(3)	4'	5	6	7^1			10	11				15^1				
heatherae				4'	5	6'''				10	11				15^1				
picea					5	6''				10	11'			$14b^1$					
castanea				4'	5	6'''				10	11'			$14b^1$					$19a^1$
unicolor	1^1	$2'^1$		4''	5	6'''				10	11'			$14b^2$					
atra		2		4		6'''			9^1	10	11'		13b	$14b^2$					$19a^2$
ruficollis		$2'^2$		4'	5	6''				10	11'	12^1							$19b^1$
inermis	1^2	2		4'	5	6''			9^2							16^1			
reticulata		2								10					$15'^1$	16^1			
striata		2				6				10	11'				$15'^1$	16^1			
planicola	1^3	2		4	5	6'				10	11'				$15'^1$	16^1			
spurgeoni		2		4	5	6'				10	11				$15'^1$	16^1			
trunci	1^4	2		4'	5	6''				10	11'				$15'^1$	16^1			$19a^3$
tribulationis	1^4	2		4	5	6''				10	11'				$15'^1$	16^1			$19a^3$
thompsoni		2		4'	5	6''				10	11'				$15'^1$	16^1			$19a^3$
vicina		2		4	5	6''				10	11'				$15'^1$	16^1			$19a^3$
laevis		$2'^3$		4'''	5	6'''			9^3	10	11'			14a					$19a^4$
sulcata		$2'^3$						8^1		10	11'			14a				18^1	19d
frerei		2									11	12^2		14a					$19a^5$
subtropica		2		4'	5	6''				10	11'			14a					$19a^5$
alutacea		2		4	5	6''	7^2							14a					$19b^2$
rufescens		2					7^3					12^3	$13a^1$	14a	15^2	$16'^2$			
perstriata	1^5	2					7^3	8^2			11	12^3		14a	15^2				
ellioti	1^6	2		4	5	6				10	11'	12^4		14a	15^2	16^3			
agnicapitis		2		4		6				10	11			14a	15^2	$16'^3$			
picta		2		4'	5	6''				10	11'	12^5	$13a^2$	14a	$15'^2$	$16'^4$			19c
bicolor		2		4	5	6				10	11	12^5		14a		$16'^4$	17	18^2	
geoffreyi	1^7	2		4	5	6				10	11			14a	$15'^2$	16^3			
minor	1^7	2		4'	5	6'				10	11			14a	$15'^2$	16^3			
sinuata		2		4	5	6								14a	$15'^2$	$16'^5$			
distinguenda		2			5	6				10	11			14a	$15'^2$	$16'^5$			$19b^3$
lustrans		2			5	6				10	11'			14a	$15'^2$	$16'^2$			$19b^3$

The cladogram (Fig. 9) erected on the basis of these character states seems to give quite good results but extreme caution is required during interpretation, because it certainly has some parallelisms. Also, some of the opinions expressed below are based on mere similarities rather than on well founded synapomorphies. On the other hand, some branchings are certainly disputable due to the validity of the supporting synopomorpies. The character of the cladogram is thus highly speculative, as may also be seen by the existence of several trichotomies or polytomies. Therefore some groupings that seem better founded are explicitly discussed below.

1. *quadraticollis*-group. The five species of this group apparently combine mostly plesiomorphic character states, hence it is uncertain whether they are really closely related. Perhaps they constitute a cluster of more or less primitive species. Within the group *P. cooki*, *P. laevigata*, and *P. alticola* are perhaps closely related, and they are perhaps also related to *P. heatherae*. *P. quadraticollis*, on the other hand, is presumably the most plesiomorphic species of this group and of the whole genus.

2. *picea*-group. Both unpatterned though still elongate species *P. picea* and *P. castanea* are perhaps more highly evolved than the species of the *quadraticollis*-group and form a distinct group of uncertain affinities. All other species are perhaps related by their more or less short and convex shape of the elytra. They divide into three distinct groups, the *unicolor*-, *trunci*-, and *sinuata*-groups, respectively, the relationships of which, however, are fairly obscure.

3. *unicolor*-group. The two unpatterned species *P. unicolor* and *P. atra* form a monophyletic unit, when absence of pattern is actually an apomorphic state. *P. ruficollis* is a rather isolated species but may be next related to both.

4. *trunci*-group. The unimaculate species of the *trunci*-group perhaps form a monophyletic group, although this is at present based on a rather weak character. Certainly, however, this group includes the most plesiomorphic species within all patterned species excluding those of the *quadraticollis*-group, which is *P. reticulata*. *P. inermis* does not fit well in this group and possesses several autapomorphic character states. Apart from its unimaculate elytral pattern, it does not share many characters with the rest of the species of the *trunci*-group. These, however, are all combined by the synapomorphic, s-shaped form of the elytral spot.

Within this latter assemblage *P. trunci*, *P. tribulationis*, *P. thompsoni*, and *P. vicina* are closely related and apparently constitute a monophyletic group. *P. planicola* and *P. spurgeoni* may be slightly less apomorphic, but are related to the above group by some apparent synapomorphic character states. All these species combine perhaps to be the sister group of *P. striata*, and together with *P. striata* they form the sister group of *P. reticulata* which seems to represent the most primitive species of the whole *trunci*-group.

5. *sinuata*-group. The rest of the species from *P. laevis* apparently form again a monophyletic unit, though the relationships within this group are highly speculative. *P. laevis* and again *P. sulcata* are highly specialized, autapomorphic species that may be related, but whose relationships are obscure. *P. frerei*, *P. alutacea*, and *P. subtropica* may form a separate group wich is perhaps the more primitive sister group of the rest of the species. *P. frerei* and *P. subtropica* share the apparently synapomorphic shape of the aedeagus, but the three mentioned species may be actually not very closely related.

The remaining species presumably form a fairly well-defined monophyletic group. *P. perstriata* and *P. rufescens* may be related to one another, but both are fairly aberrant species, perhaps rather remotely related to the rest of species, whereas all other species may form a monophyletic unit. *P. ellioti* and *P. agnicapitis* may be in some respects more plesiomorphic than the remaining species which all possess a markedly sinuate apical elytral spot. Certainly *P. picta* and *P. bicolor* are closely related due to their similar, highly complex pattern. *P. geoffroyi* and *P. minor* may form another group, but this is uncertain. The last three species (*P. sinuata*, *P. distinguenda*, and *P. lustrans*) are again closely related and are distinguished only by minor characters of shape, microreticulation, pattern, and structure of aedeagus.

To conclude, the present 35 species can presumably be referred to only five different stocks, three of which are perhaps more closely related to each other, than any to the *quadraticollis*-group.

DISTRIBUTION

Despite of the large number of recorded species, the material is still insufficient for a final review of the distributions. Many species are still known from a single locality or mountain top without our knowing whether this apparent limited range is due to inappropriate sampling, or whether it reflects the actual range. Therefore, any considerations about ranges and why the ranges of certain species differ to such large extent are somewhat hypothetical.

Nevertheless, I have tried to point out the current knowledge of the species ranges in the following tables which list altitude ranges (Table 4) and the recorded species for each locality (Table 5). The known localities are also depicted in maps that are based on a subdivision of the wet tropics region of north Queensland in 19 different mountain/rainforest blocks according to the classification used by G. Monteith for his survey of the rainforest fauna of north Queensland (Fig.

TABLE 4. Recorded altitude range of known species of *Philipis* (altitudes below 500m in bold type).

Species	altitude	Species	altitude
quadraticollis	1000-1180m	*vicina*	850m
alticola	1560m	laevis	1000-1300m
cooki	1100-1330m	sulcata	**480**-1300m
laevigata	1100-1250m	frerei	1500-1620m
heatherae	1050m	*subtropica*	1100-1400m
picea	860m	alutacea	1500-1560m
castanea	780-1300m	*rufescens*	1500-1560m
unicolor	900-1440m	*perstriata*	1620m
atra	900m	elliоti	1000-1150m
ruficollis	850-1100m	agnicapitis	1200m
inermis	1100m	picta	1050-1100m
reticulata	1000m	bicolor	1100m
striata	**150**-600m	*geoffreyi*	1250-1300m
planicola	**5-100**m	*minor*	1180m
spurgeoni	1330m	*sinuata*	1500-1620m
trunci	1000-1300m	distinguenda	**480**-1200m
tribulationis	680-1225m	lustrans	950-1200m
thompsoni	700-1250m		

17B). Each rainforest block is defined by more or less natural barriers as depicted in the maps. In a final list the occurrence of the species in these rainforest blocks is listed (Table 6). As a summary of those lists and maps the following conclusions may be drawn:

1. 33 of 35 known species occur in northeastern Queensland, especially in the mountains at the eastern fringes of the Atherton and Carbine Tablelands. The northern border of the range of the genus is on Mt. Finnigan, south of Cooktown. South of the tablelands few species occur on some scattered mountain tops only (Mt. Macalister, Mt. Elliot, Mt. Macartney, Lamington Plateau, Springbrook Plateau). Surprisingly enough, no *Philipis* has been thus far recorded on the prominent plateaus of Mt. Spec south of Ingham and Eungella west of Mackay, although G. Monteith has sampled both plateaus. Hence the main centre of diversity of the genus is certainly the Carbine Tableland and the Bellenden Ker Range of northeastern Queensland.

2. Almost all species occur in montane rainforest above about 900m, and only two species (*P. planicola, P. striata*) have been recorded at or near see level, whereas another two species extend as far down as about 500m. But in the respective areas this is already at the level where montane rainforest exists. Many species occur regularly above 1000m, and surprisingly many species live only on the highest tops of the respective mountains. On Bellenden Ker and Bartle Frere for example, those species apparently do not descend below 1500m. Thus *Philipis* is primarily a genus of montane species and the few lowland species have probably reached this level secondarily.

3. Of 35 recorded species, 23, that is more than two thirds, are from a single locality or mountain top (Table 5). They are especially common on the isolated tops of Mt. Finnigan, Thornton Peak, Mt. Spurgeon, on the Carbine Tableland, on Mt. Bellenden Ker and Mt. Bartle Frere, and again in the southern part of the range of the genus. On the Atherton Tableland, on the other hand, only one widespread species (*P. thompsoni*) occurs but only on the mountains that make up the western border of the tableland. A single apparently endemic species has been found on the Lamb Range at the eastern fringe of the Tableland. So the fauna of the Atherton Tableland is surprisingly poor and is therefore in sharp contrast to the ranges east of the tableland with their rich, endemic faunas.

Three species (*P. castanea, P. cooki, P. sulcata*) that have been collected at several localities, nevertheless occur on a single range or tableland only (Cape Tribulation-Thornton Peak area, and Carbine Tableland area, respectively). At the current state of knowledge they are endemic to the respective range.

Three further species (*P. striata, P. tribulationis, P. sinuata*) occur on two adjacent ranges or tablelands which are separated by a river or creek valley that reaches below 500m. The first two species live in the Cape Tribulation and Windsor Tableland, and Cape Tribulation and Carbine Tableland areas, respectively, which are both separated by the Daintree River. *P. sinuata* occurs on Mt. Bellenden Ker and Mt. Bartle Frere that belong to a common range, but are separated by the deeply incised valley of Babinda Creek in the Babinda area. Actually *P. sinuata* occurs only at high altitude (above 1500m) on both mountain tops. A further species, *P. quadraticollis*, is somewhat enigmatic, because it has been found on the Carbine Tableland and again in the Massey Range at the western slope of the Bellenden Ker Range. This is indeed a very wide gap, but the single two known specimens of this species are both females, therefore I am not entirely convinced that they are actually conspecific.

Another two species (*P. lustrans, P. unicolor*) occur on several adjacent ranges (Malbon

Thompson Range, Lamb Range, Massey Range, Bellenden Ker Range, or Malbon Thompson Range, Bellenden Ker Range, and Mt. Bartle Frere, respectively) that are separated by the Mulgrave River, Little Mulgrave River, and Babinda Creek valleys, respectively, but nevertheless are part of a former common tableland.

One species, *P. planicola*, is outstanding, because it has been recorded only at very low altitude in the eastern foothills of the Bellenden Ker Range, where it is an inhabitant of lowland rainforest. Even so this species seems to be localized in this area.

Only a single species (*P. thompsoni*) is really wide-ranging. It occurs on almost all ranges surrounding the Atherton Tableland from Kuranda in the north, but not in the Bellenden Ker and Bartle Frere ranges at the eastern border of the tableland. It extends beyond the Atherton Tableland to the south in the Tully area and further south in the Cardwell Range.

In conclusion it should be stressed that almost all species are endemic to one mountain top or range, or limited to a system of adjacent ranges or tablelands that certainly formed previously a common range. However, only one species is actually widespread, and another, somewhat dubious species occurs apparently on two widely separated ranges. By far most species occur in the Carbine and Bellenden Ker/Bartle Frere rainforest blocks (Fig. 10), remarkably fewer in the isolated Finnigan and Thornton blocks, in the Lamb Range block west of Cairns, and on the coastal Malbon Thompson Range, but single species only are scattered through the other rainforest zones.

A similar general distribution pattern has been found in flightless, ground-living carabids that inhabit montane rainforest, namely of the genera *Notonomus* and *Trichosternus* (Darlington 1961a, b), and according to G. Monteith (pers. comm.) also in the (likewise flightless) Tenebrionidae of the subfamily Adeliinae, and in Aradidae. These are all groups of low agility that inhabit either the forest floor or tree trunks and logs. In all groups the Bellenden Ker Range and the Carbine Tableland possess by far the richest fauna of endemic species, whereas some species of the Atherton Tableland are widespread and occur on several mountain tops. Hence this distribution pattern and the underlying biogeographical events are very similar in several insect groups of low vagility including *Philipis*.

TABLE 5. List of localities and the respective recorded species (species occurring on a single locality or mountain top printed in bold types).

Mt. Finnigan	ruficollis, ***inermis***, ***picta***
Mt. Misery	***vicina***
Cape Tribulation	*castanea*, *striata*, *tribulationis*
Thornton Peak	*castanea*, ***trunci***, ***laevis***
Windsor Tableland	*tribulationis*
Carbine Tableland	*cooki*
Mt. Spurgeon	***laevigata***, ***spurgeoni***, ***geoffreyi***
Devils Thumb	*quadraticollis*, *cooki*, *sulcata*
Plane Crash Site	*sulcata*
Mossman Bluff & Track	*cooki*, ***picea***, *striata*, *sulcata*, ***minor***, ***distinguenda***
Pauls Luck	*sulcata*
Mt. Demi	*cooki*, ***bicolor***
Mt. Lewis	*cooki*
Mt. Formartine South	*thompsoni*
Lambs Head	***agnicapitis***, *lustrans*
Emerald Creek	*thompsoni*
Mt. Edith	*thompsoni*
Isley Hills	***heatherae***, *thompsoni*
Mt. William	*thompsoni*
Bell Peak North	*unicolor*, *lustrans*
Mt. Bellenden Ker	***alticola***, *unicolor*, ***reticulata***, ***alutacea***, ***rufescens***, *sinuata*, *lustrans*
Massey Range	*quadraticollis*, *thompsoni*, *lustrans*
Bellenden Ker Range foothills	*planicola*
Russell River	*planicola*
Mt. Bartle Frere	*unicolor*, ***frerei***, ***perstriata***, *sinuata*
Baldy Mt.	*thompsoni*
21 km S. Atherton	*thompsoni*
Hugh Nelson Range	*thompsoni*
Mt. Fisher	*thompsoni*
Mt. Father Clancy	*thompsoni*
Upper Boulder Creek	*thompsoni*
Mt. Macalister	*thompsoni*
Mt. Elliot	***ellioti***
Mt. Macartney	***atra***
Lamington Plateau	*subtropica*
Springbrook Plateau	*subtropica*

BIOGEOGRAPHY

Philipis is essentially tropical. However, it is a phylogenetically plesiomorphic and, therefore, old genus, perhaps closely related to the, likewise tropical South American *Xystosomus* lineage. If that phylogenetic status is right, according to its

TABLE 6. Mountain/rainforest blocks of north Queensland and the recorded species of *Philipis* (for names of zones see Fig. 17B. Two species (*P. atra* and *P. subtropica*) do not occur within the tabulated area.

Philipis species	1	2	3	4	6	7	8	9	11	12	13	14	15	19
quadraticollis				X					X					
alticola									X					
cooki				X										
laevigata				X										
heatherae						X								
picea				X										
castanea		X												
unicolor		X							X	X				
ruficollis	X													
inermis	X													
reticulata									X					
striata		X		X										
planicola									X		X			
spurgeoni				X										
trunci		X												
tribulationis		X	X											
thompsoni					X	X	X		X			X	X	
vicina	X													
laevis		X												
sulcata				X				X						
frerei									X					
alutacea									X					
rufescens									X					
perstriata									X					
ellioti														X
agnicapitis						X								
picta	X													
bicolor				X										
geoffreyi				X										
minor				X										
sinuata									X					
distinguenda				X										
lustrans						X				X				
summary	4	5	1	11	1	4	1	1	12	2	1	1	1	1

distribution *Philipis* may constitute a part of the ancient tropical-subtropical "old Gondwanan faunal element" (Howden, 1981; Baehr, 1990b). Nevertheless, it is unknown where and in which environment the original stock of *Philipis* survived in Australia during the very long time of changing environmental conditions of the late Mesozoic and early Tertiary periods.

Although the genus is widely distributed, the most plesiomorphic species still occur in northeastern Queensland. Hence, the genus may always have lived in more or less tropical rainforest. It is unknown, however, whether the moss-inhabiting way of life is the original one, or has been adopted later. It is likewise unknown, whether the genus has been always as montane as it is today, since most ranges and tablelands that it inhabits at present have been built up or uplifted comparative recently, during the Pliocene and Pleistocene.

Phylogenetic evidence reveals the existence of two main present centres of diversity and species richness, namely the Carbine Tableland and the eastern fringe of the Atherton Tableland (especially the Bellenden Ker and Bartle Frere ranges), with several pairs of rather closely related species occurring in both areas (*P. cooki-P. alticola, P. striata-P. planicola, P. tribulationis-P. thompsoni, P. distinguenda-P. sinuata*). The species that are presumably most plesiomorphic also occur in these areas. Within both areas the degree of endemicy is fairly low because several species occur on adjacent ranges or tablelands, but almost no species occurs in both areas. The single exception is *P. quadraticollis* that occurs on the Carbine Tableland and in the Bellenden Ker Range. It is perhaps the most plesiomorphic species of the whole genus, but the specific status of both populations (that are both known by only a single female specimen) is not yet fully settled.

From the Carbine Tableland the rather isolated monutain tops of Mt. Spurgeon, Thornton Peak, and Mt. Finnigan (as well as Mt. Misery) have been colonized. All three tops are inhabited by three species endemic to the respective mountain, but the fauna of the most isolated Mt. Finnigan is phylogenetically most isolated, because *P. ruficollis* and *P. inermis* do not posses a close relative, and the third species, *P. picta*, is related to *P. bicolor* of Mt. Demi only. The faunas of Thornton Peak and Mt. Spurgeon, on the other hand, are more vclosely related to those of the eastern parts of Carbine Tableland. The species which occur on all three tops however belong to different stocks, thus showing that there have been three different colonisation or speciation events on each top although those on Mt. Finnigan were perhaps the oldest.

In the ranges at the eastern fringe of the Atherton Tableland the situation is rather simple with: (1). Some species inhabiting several adjacent ranges (Lamb Range, Malbon Thompson Range, Bellenden Ker Range); (2). Additional species with a slightly more limited range; (3). Some species occurring only on the Bellenden Ker Range; and (4). Several species endemic to either Mt. Bellenden Ker or Mt. Bartle Frere. This distribution pattern may reflect populations of different age that have been isolated to a different degree. In the southern part of the range of the genus the species density is low, but as in the northern part of the range, all species are endemic to a single mountain top and most are more or less closely related to a species occurring further north.

Although the phylogenetic analysis is not conclusive, it seems as if the faunas of both Carbine Tableland and of the ranges at the eastern fringe of Atherton Tableland are composed of both fairly wide-ranging, rather plesiomorphic species and usually endemic, apomorphic species with limited ranges. With regard to the existence of some pairs of closely related species in both areas, it may be suggested that the former ranges of the stocks of several recent species have been wide and have been rather recently interrupted.

According to the patterns of distribution, the phylogenetic evidence, and the known paleogeographic, climatic, and floristic history of northeastern Australia, the history of the genus may be thus hypothetized as following: *Philipis* is an old and in certain respects very plesiomorphic genus that lived presumably always under subtropical and perhaps even tropical conditions in rainforest and may be a part of the so-called "Old Gondwanan element", because its nearest relative is perhaps the tropical South American *Xystosomus* lineage. However, most species seem to be young according to their very similar external and genitalic structures. The high species diversity of the genus may be thus a rather recent event and may be caused by the combination of three geologic and climatic factors:

(1) Uplift of much of the Great Dividing Range during Pliocene and Pleistocene and its following disintegration into more or less isolated tops and tablelands due to rapid erosion.

(2) Gradual climate change of Australia to a warmer and drier climate with more pronounced dry seasons as the Australian block drifted northwards. While lowlands became drier and hotter and less favourable for rainforest living animals, mountain tops remained cooler and wetter because of the altitude and of orographic rains from the nearby sea.

(3) Repeated and more radical climatic changes during the "ice age" when rainforests retreated up the mountains to form small, isolated, pockets during glacials when the sea level was low and the mountains were far away from the coast, and descended again during the interglacials to become more or less continuous forests.

The effects of all three events were superimposed on a gradual retreat of the rainforest to the mountain tops and a general isolation of rainforest pockets during late Tertiary and the Pleistocene glacials, interrupted only by a temporary but repeated spreading of rainforest during the Pleistocene interglacials. It seems that these

climatic and floristic events repeatedly separated and rejoined formerly wide species ranges, that can be postulated for example for the Carbine Tableland and the mountains east to the Atherton Tableland on the basis of several pairs of closely related species occurring in both areas, and thus supported allopatric speciation on single mountain tops or ranges by geographical isolation. As a consequence, more than two thirds of the extant species are endemic to a single mountain top. According to phylogenetic data, the present 35 species can be referred to only 5 original stocks, representatives of which occur in both main centres. Hence speciation presumably occurred mainly by vicariance of populations separated by uplifting of ranges or tablelands, either due to development of barriers through rapid erosion of formerly more homogenous areas, or to dismembering and isolation of formerly continuous rainforest areas due to climatic changes.

At the northern and southern borders of the range however, some speciation may have occurred by colonisation of isolated tops rather than by parainsular reproductive isolation.

Main speciation events (producing the present species) perhaps occurred as late as during Pleistocene, whereas less ample speciation (which perhaps led to the founding species of the main species groups or of the main branchings within the species groups) occurred in late Tertiary.

In this context the question arises, whether the species of this genus had been formerly as "montane" as they are at present, or whether thay have trapped on the mountain tops, where they still persist. If *Philipis* is actually an old genus and at the same time an "Old Gondwanan element", then it lived for a long period under warm temperate to subtropical circumstances, until Australia - presumably at the end of Miocene - finally arrived at its present position. Only then the genus or the original stocks may have adapted to tropical climate. Therefore, it is conceivable that the genus escaped full tropical conditions in refugia on the highest mountain tops with their more temperate climatic conditions. On these reasons I believe, that the genus has been montane for a long time, and that its present montane, moss-living habits are old.

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